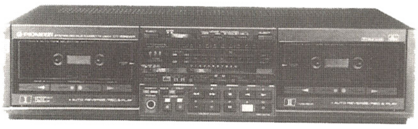
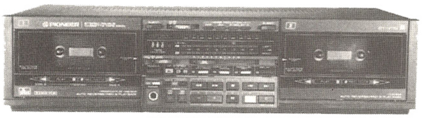
PIONEER

Service Manual

CIRCUIT DESCRIPTIONS
REPAIR & ADJUSTMENTS



- CT-S99WR[BK]



- CT-V70[BK]

ORDER NO.
ARP-781-0

STEREO DOUBLE CASSETTE TAPE DECK

CT-S99WR
CT-S99WR(BK)
CT-V70(BK)

(KU type only)

- Model CT-S99WR[BK] is a black version of the CT-S99WR.
- Model CT-V70 is the same as the CT-S99WR except for the exterior design and the remote control, CT-V70 has remote control IN/OUT terminals.
- Model CT-S99WR [BK]/D/G (U.S. Military model) has wooden side panels and the remote control IN/OUT terminals.
- Models CT-S99WR[BK] (black) and CT-S99WR (silver) come in versions distinguished as follows:

Type	Applicable model		Power requirement	Destination
	CT-S99WR[BK]	CT-S99WR		
KU	○	–	AC120V only	U.S.A.
HEM	○	○	AC220V (240V)*	European continent
HB	○	–	AC240V (220V)*	United Kingdom
D	○	–	AC120V/220V/240V (switchable)	General market
D/G	○	–	AC120V/220V/240V (switchable)	U.S. Military

*Change the primary wiring of the power transformer.

- This service manual is applicable to the KU, HEM, HB, D and D/G types.
- As to the HEM, HB, D and D/G types, please refer to pages 126 – 129.
- Ce manual d'instruction se refère au mode de réglage en français. (p. 26 – p. 34)
- Este manual de servicio trata del método ajuste escrito en español. (p. 35 – p. 43)

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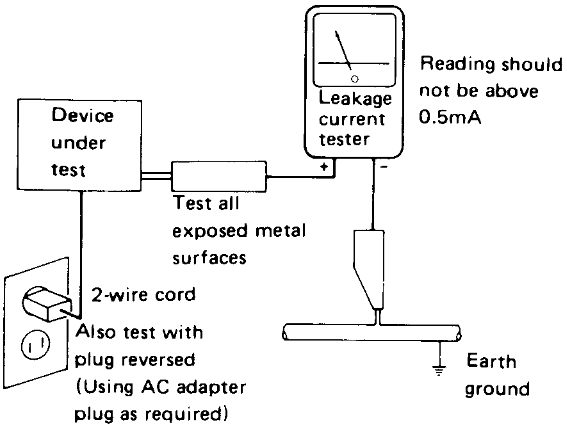
SAFETY INFORMATION

1. SAFETY PRECAUTIONS

The following check should be performed for the continued protection of the customer and service technician.

LEAKAGE CURRENT CHECK

Measure leakage current to a known earth ground (water pipe, conduit, etc.) by connecting a leakage current tester such as Simpson Model 229-2 or equivalent between the earth ground and all exposed metal parts of the appliance (input/output terminals, screwheads, metal overlays, control shaft, etc.). Plug the AC line cord of the appliance directly into a 120V AC 60Hz outlet and turn the AC power switch on. Any current measured must not exceed 0.5mA.


Leakage current tester
Reading should not be above 0.5mA
Device under test
+
-
Test all exposed metal surfaces
2-wire cord
Also test with plug reversed (Using AC adapter plug as required)
Earth ground

AC Leakage Test

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

2. PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in the appliance have special safety related characteristics. These are often not evident from visual inspection nor the protection afforded by them necessarily can be obtained by using replacement components rated for voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual.

Electrical components having such features are identified by marking with a ⚠ on the schematics and on the parts list in this Service Manual.

The use of a substitute replacement component which dose not have the same safety characteristics as the PIONEER recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards.

Product Safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current PIONEER Service Manual. A subscription to, or additional copies of, PIONEER Service Manual may be obtained at a nominal charge from PIONEER.

QUESTIONNAIRE

MODEL ____________________
One Model per questionnaire

Dear Servicer,

Thank you for your cooperation in the post-sale service of Pioneer products.

This questionnaire is used as a tool to improve the serviceability of our products and service manuals. Please evaluate this model and service manual by answering the following questions. Your ideas may be realized in our future products. Your answers will be appreciated. Thank you.

PIONEER ELECTRONIC CORP.

T. Nakagawa, Manager, Service Section, International Division

1. SERVICING EVALUATION	Circle applicable number:	Good		Fair		Poor
a. Disassembly/Re-assembly:		1	2	3	*4	*5
b. Circuit Checks:		1	2	3	*4	*5
c. Replacement of Parts:		1	2	3	*4	*5
d. Adjustment (s):		1	2	3	*4	*5

* If (4) or (5) was circled, please be specific.

e. Your advice, opinion or ideas related to servicing this product.

2. SERVICE MANUAL EVALUATION

a. Circuit & Mechanism Description

b. Circuit Diagram

3. OTHER

Please describe other areas of servicing which you may find difficult.

Completed by :

Date :

Company Name :

Address :

City/State/Zip :

Please send this form filled to the distributor in your country.

1. SPECIFICATIONS

Systems	4 track, 2-channel stereo
Heads	"Hard Permalloy" recording/playback head x 2 "Ferrite" erasing head x 2
Motor	DC servo motor x 2 DC reel motor x 2 DC assist motor x 2
Wow and Flutter	No more than 0.06% (WRMS) No more than ± 0.16% (DIN)
Fast winding Time	Approximately 100 seconds (C-60 tape)
Frequency Response	
−20 dB recording:	
Normal tape	25 to 17,000 Hz
Chrome tape	25 to 17,000 Hz
Metal tape	25 to 18,000 Hz
0 dB recording:	
Chrome tape	25 to 9,000 Hz
Metal tape	25 to 14,000 Hz
Signal-to-Noise Ratio	
Dolby NR OFF	More than 57 dB
dbx ON	92 dB
Noise Reduction Effect	
Dolby NR B type ON	More than 10 dB (at 5 kHz)
Dolby NR C type ON	More than 19 dB (at 5 kHz)
Dynamic range (dbx ON)	110 dB
Harmonic Distortion	No more than 1.0% (0 dB)
Input (Sensitivity)	
LINE (INPUT)	63 mV (Input impedance 78 kΩ)
Output (Reference level)	
LINE (OUTPUT)	316 mV (Output impedance 4.6 kΩ)
Headphone	0.24 mW (Load impedance 8 Ω)

Subfunctions

- Relay recording
- Relay playback
- Random programmed playback (Deck I)
- High-speed and normal-speed tape copying (Deck I → Deck II)
- Random programmed tape copying (high speed and normal speed, Deck I → Deck II)
- Parallel recording (Deck I, II)
- Skip search/music search (Deck I, II)
- Noise reduction systems (dbx, Dolby NR B/C types)
- Auto tape selector (Deck I, II)
- Timer function
  (Unattended recording: Deck I → Deck II)
  (Wake-up playback: Deck I only)
- Headphone jack
- Automatic recording mute function
- Level meter
- Tape counter (Deck I)

Miscellaneous

Power Requirements	
KU, KC models	AC 120 V, 60 Hz
HEM model	AC 220 V, 50/60 Hz
HB, HP models	AC 240 V, 50/60 Hz
D, D/G models	AC 120 V/220 V/240 V, 50/60 Hz (switchable)
Power Consumption	
KU, KC models	37 W
HEM, HB, HP models	37 W
D, D/G models	29 W
Dimensions (Except for D/G model)	420 (W) x 101 (H) x 315 (D) mm 16-9/16 (W) x 4 (H) x 12-6/16 (D) in
(D/G model)	458 (W) x 102 (H) x 315 (D) mm 18-1/16 (W) x 4 (H) x 12-6/16 (D) in
Weight [(without package) except for D/G model]	6.4 kg (14 lb 2 oz)
[(without package) D/G model]	7.2 kg (15 lb 14 oz)

Accessories

Operating instructions	1
Connection cord with pin plugs	2
Control cord (Only D/G model and CT-V70)	1

NOTE:
Specifications and design subject to possible modifications without notice due to improvements.

INFORMATION TO USER [FOR U.S.A. MODEL]

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- reorient the receiving antenna
- relocate this component with respect to the receiver
- move this component away from the receiver
- plug this component into a different outlet so that component and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:
"How to Identify and Resolve Radio-TV Interference Problems".
This booklet is available from the US Government Printing Office, Washington, D.C., 20402, Stock No. 004-000-00345-4.

The above instructions apply only to units which will be operated in the United States.

2. FRONT PANEL FACILITIES

REVERSE MODE switch

Reset button

LEVEL meter

TAPE COUNTER

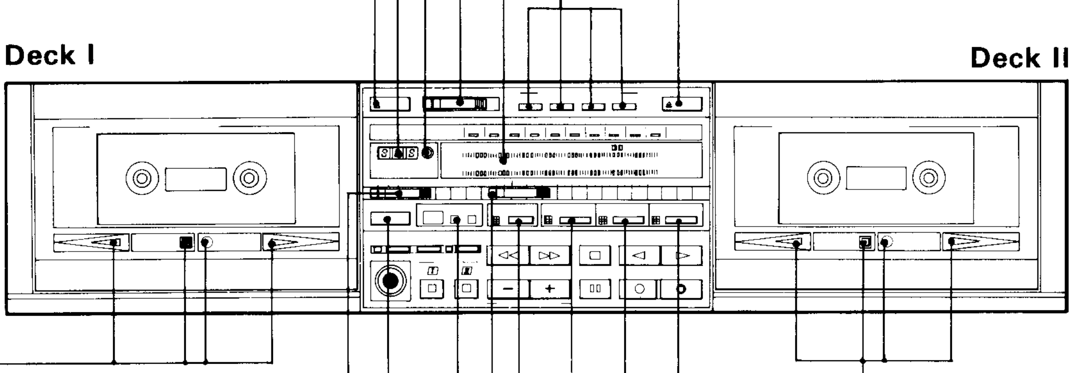
Indicates the transport position of the tape loaded in deck I with a threedigit counter.

NOISE REDUCTION switches

EJECT button

If the power is disconnected while a tape is running, the eject function will not operate. In such a case, turn on the power once again, and then press the EJECT button.

EJECT button



Mode indicators

◁	: Lights during the reverse mode. Flashes during the pause mode, and when inputting random programmed play selections on tape side B.
□	: Lights during playback mode.
○	: Lights during recording mode. Flashes during recording muting mode.
▷	: Lights in the forward mode. Flashes during the pause mode , and when inputting random programmed play selections on tape side A.

Mode indicators

RELAY switch

PARALLEL REC switch

SYNCHRO COPY/NORMAL switch (normal speed)

SYNCHRO COPY/HIGH SPEED switch (2x speed)

REC LEVEL control

NR SYSTEM indicators

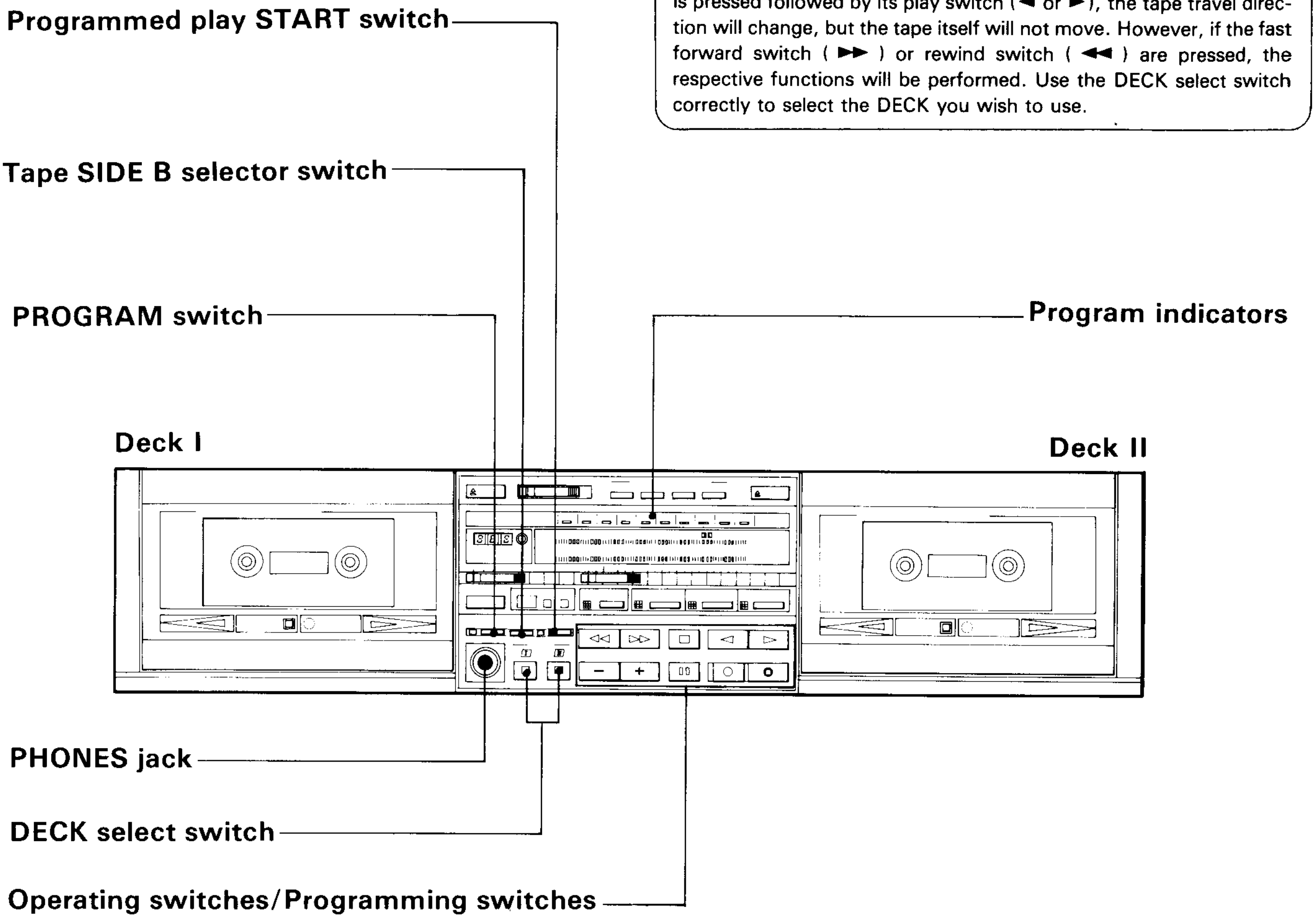
POWER switch

TIMER STD-BY switch

Used only when performing unattended recording or wake-up playback. Normally, leave in the OFF position.

Deck select switches and operating switches:

During recording or playback, even if the opposite DECK select switch is pressed followed by its play switch (◄ or ►), the tape travel direction will change, but the tape itself will not move. However, if the fast forward switch (►►) or rewind switch (◄◄) are pressed, the respective functions will be performed. Use the DECK select switch correctly to select the DECK you wish to use.



Operating switches/Programming switches

These switches are used both for operating deck I and deck II, and also for programming selections for random programmed playback.

[When used as operating switches]

◄◄ : Rewind switch

►► : Fast forward switch

■ : Stop switch. Press also to stop parallel recording, normal speed copying, high-speed copying, normal speed edit copying, and random programmed tape copying.

◄ : Reverse play switch. Press to play back the reverse side of the tape (the side opposite from the side visible in the holder).

► : Forward play switch. Press to play back the forward side of the cassette tape (the side visible in the holder).

–
+ : Press when performing skip search and music search.

▮▮ : Pause switch. Press to temporarily stop the tape travel. To restart the tape travel, press once again. The pause function does not operate when the deck is in the fast forward or rewind modes.

● : Recording switch. The deck cannot be placed in the recording mode if a cassette with broken erasure prevention tabs is loaded, or if no tape cassette is loaded.

○ : Recording muting switch. Press during recording to eliminate unwanted portions, or to create a non-recorded interval between tracks.

[When used as programming switches]
Used during random programmed play operation.

- Noise reduction manufactured under license from Dolby Laboratotries Licensing Corporation.
- "Dolby" and the double-D symbol are trademarks of Dolby Laboratories Licensing Corporation.

- dbx is a trademark of dbx Incorporated.

3. DISASSEMBLY

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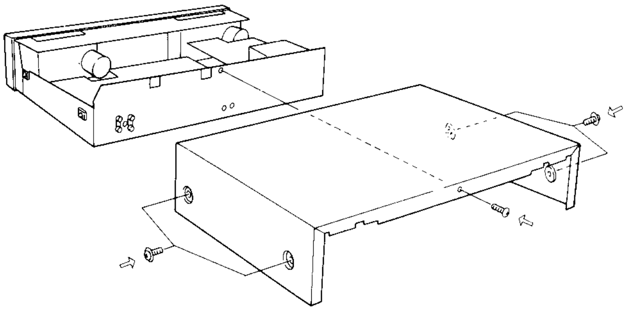
3.10 Disassembly of the level meter assembly 13
3.11 Disassembly of the door indicator unit 14
3.12 Disassembly of the button holder 14

3.1 DISASSEMBLY OF THE TAPE TRANSPORT UNIT

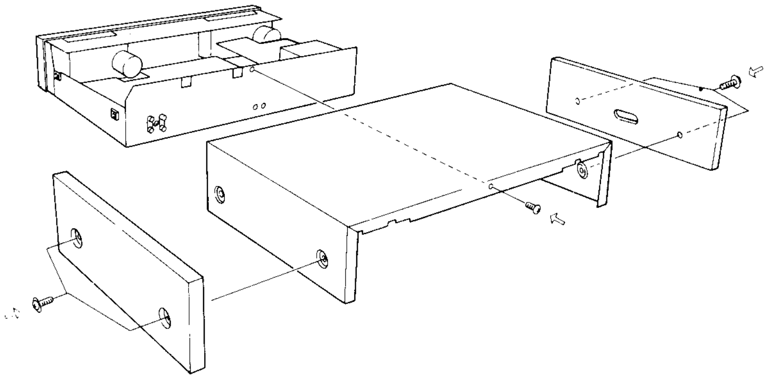
1. Remove The Bonnet Case

Undo the screws in the left and right hand sides of the bonnet case (two screws per side) and the screw in the top center of the rear panel. The side wood panels in CT-S99WR/D/G are disassembled and reassembled together with the bonnet.

- CT-V70 and CT-S99WR (without D/G)

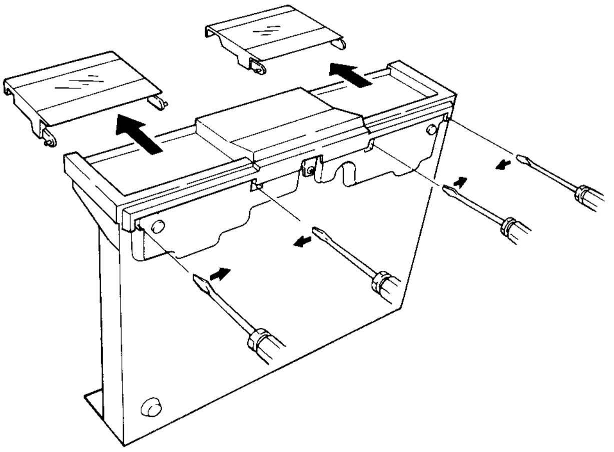


- CT-S99WR/D/G (with Side Wood Panels)



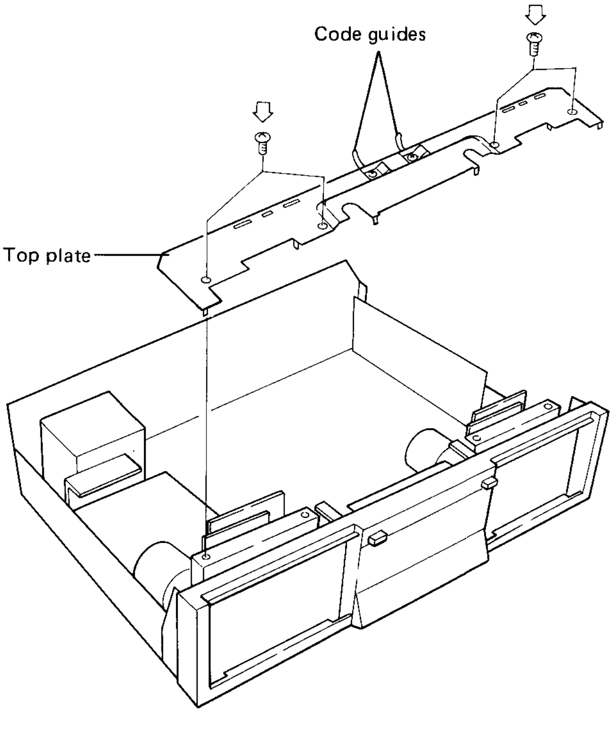
2. Remove The Doors

Stand the set upright and insert screwdrivers into the gaps between the front panel and the chassis in the bottom of the set. By bending the hinge sections of the doors towards the center of each door, the doors can be pulled out in the direction of the arrows.

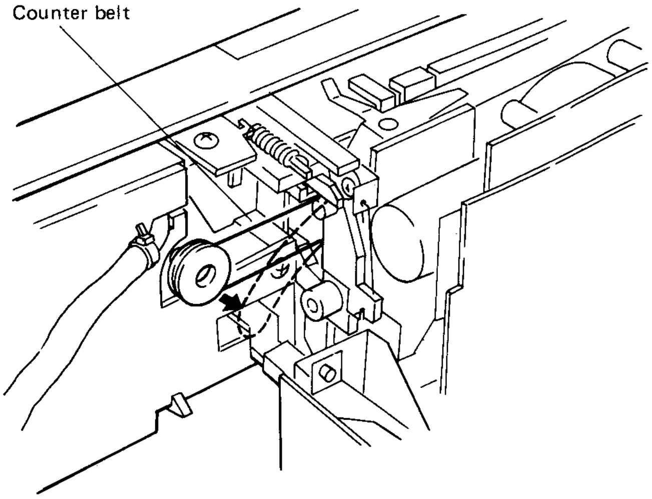


3. Remove The Top Plate

Release the lead wires by expanding the cord guides, and undo the four setscrews.

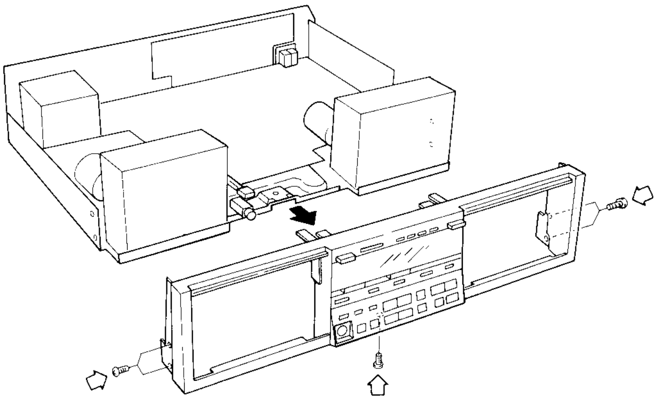


4. Remove The Deck I Counter Belt



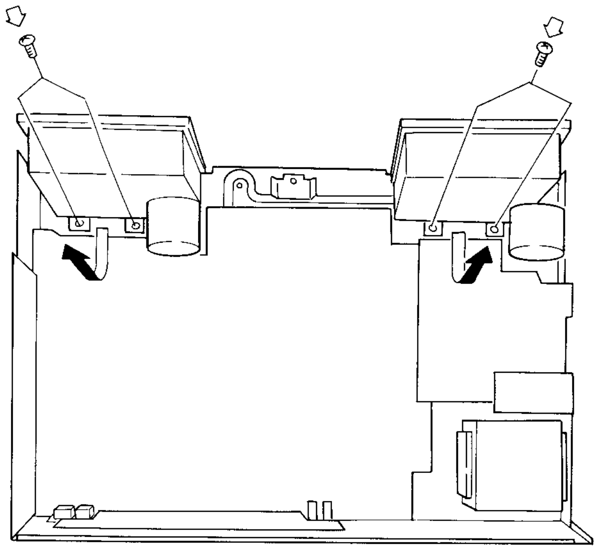
5. Remove The Front Panel

Undo the setscrews in the left and right hand sides (two screws each side) and the setscrew in the bottom center, and then pull the front panel out forwards.



6. Remove The Tape Transport Unit

Undo the two setscrews securing each tape transport unit, and then remove each unit by swivelling the unit base back and up.

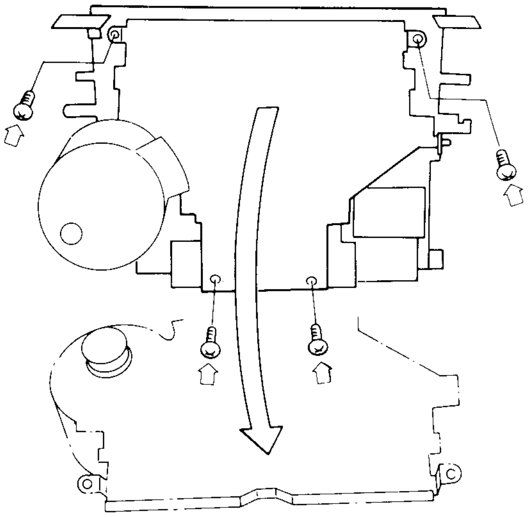


3.2 BELT REPLACEMENT

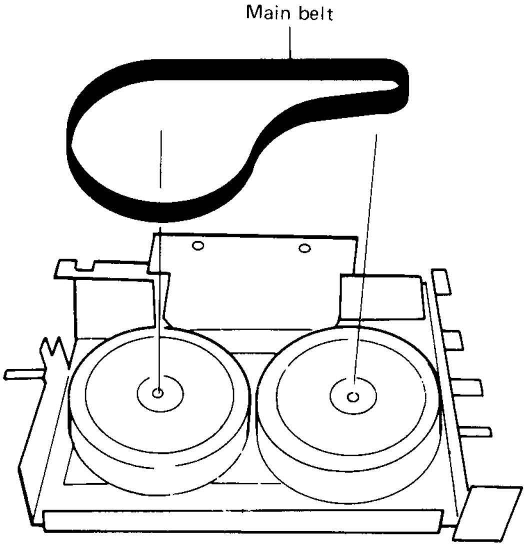
1. Remove The Tape Transport Units from The Chassis (See pages 6 thru 8.)

2. Remove The Motor Bracket

Undo screws in all four corners to remove the motor bracket from the chassis.

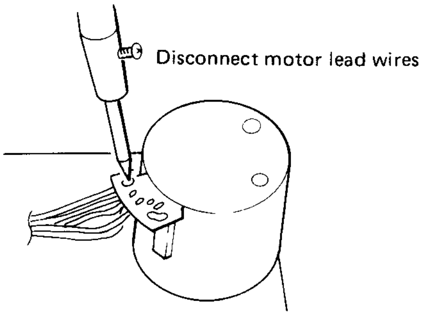


3. Replace The Belt, And Reassembly in The Reverse Order

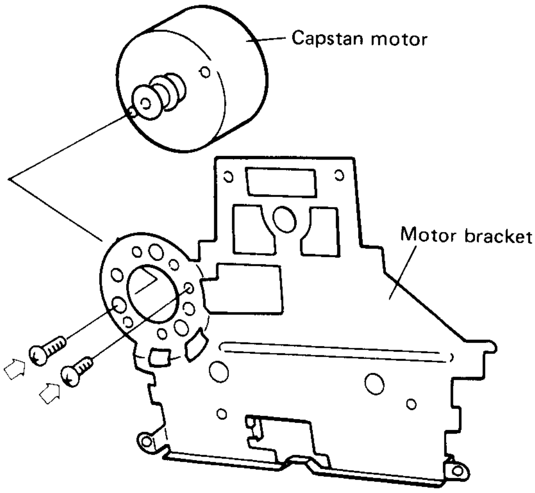


3.3 CAPSTAN MOTOR REPLACEMENT

1. **Remove The Tape Transport Units from The Chassis** (See pages 6 thru 8.)
2. **Disconnect The Motor Lead Wires from The Motor**


Disconnect motor lead wires

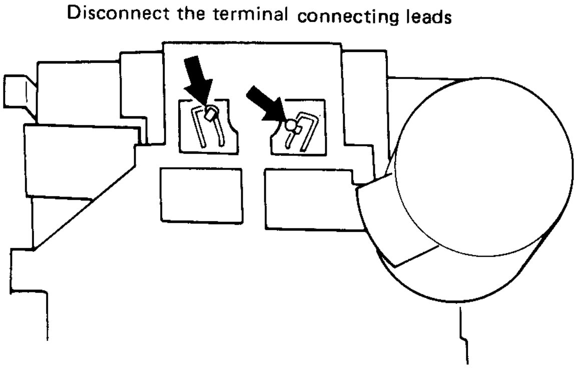
3. **Remove The Motor Bracket**
(See step 2 in previous procedure.)
4. **Remove Bracket from The Motor, And Replace The Motor**


Capstan motor
Motor bracket

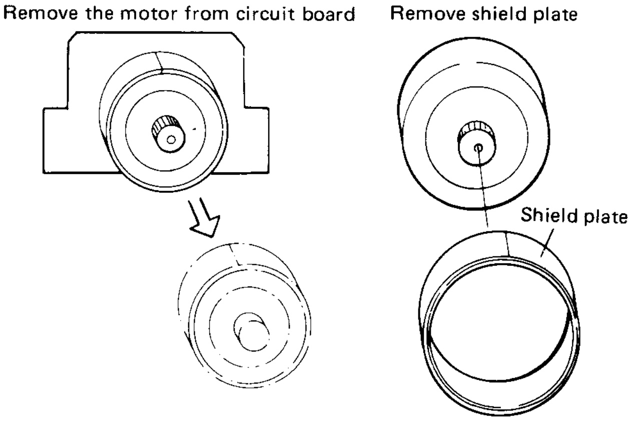
5. **Reassemble in The Reverse Order (Making Sure That The Motor Is Mounted in The Correct Direction).**
6. **Adjust Tape Speed**

3.4 REEL MOTOR REPLACEMENT

1. **Remove The Tape Transport Units from The Chassis** (See pages 6 thru 8.)
2. **Remove The Motor Bracket**
(See page 8.)
3. **Using A Soldering Iron, Disconnect The Jumper Leads from The Reel Motor Terminals.**


Disconnect the terminal connecting leads

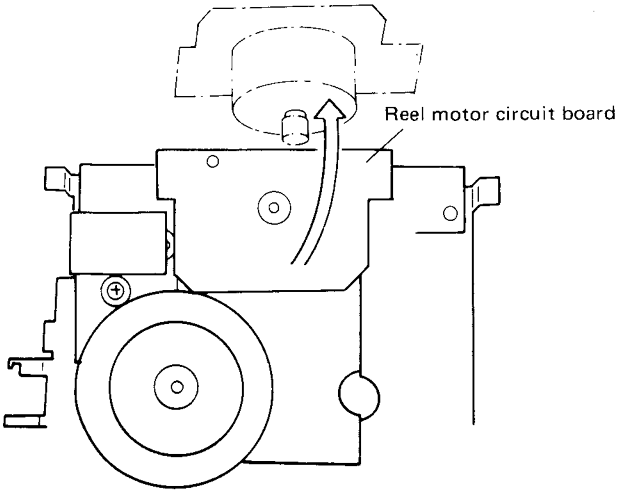
4. **Remove The Reel Motor from The Circuit Board, And Also Remove The Shield Plate.**


Remove the motor from circuit board
Remove shield plate
Shield plate

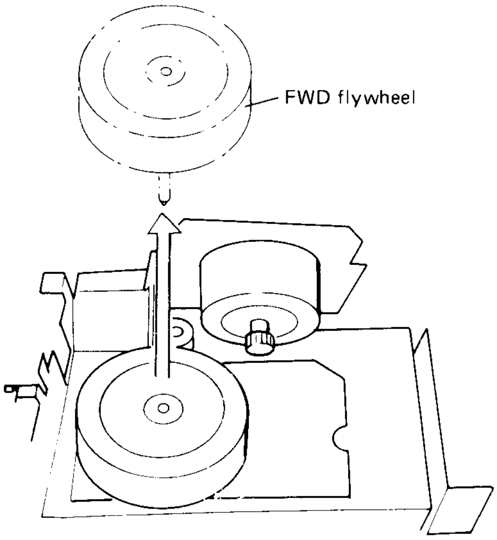
5. **Fit The Shield Plate onto A New Motor And Fix into Position with Bond.**
6. **Secure by Wrapping Mylar Tape Around The Outside.**
7. **Reassemble in The Reverse Order (Reversing The Operations in Steps 3 thru 1).**

3.5 ASSIST MOTOR REPLACEMENT

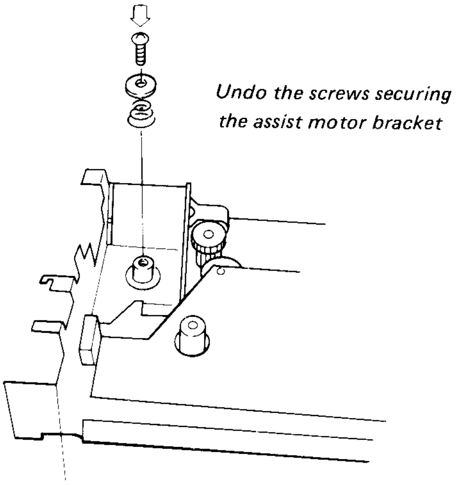
1. **Remove The Tape Transport Units from The Chassis** (See pages 6 thru 8.)
2. **Remove The Motor Bracket** (See Page 8.)
3. **Remove The Reel Motors (Together with Their Circuit Boards) from The Chassis.**


Reel motor circuit board

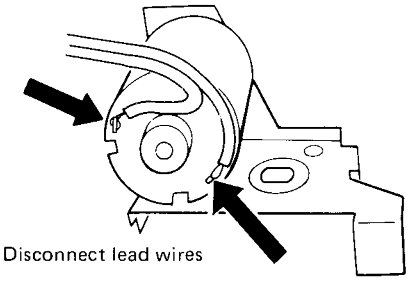
4. **Remove The FWD Flywheel**


FWD flywheel

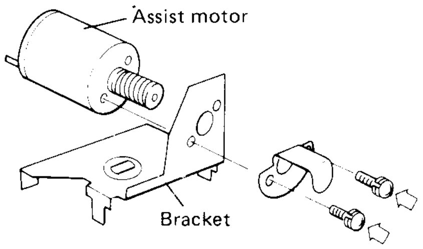
5. **Remove The Assist Motor (Together with Corresponding Bracket) from The Chassis.**


Undo the screws securing the assist motor bracket

6. **Disconnect The Lead Wires from The Terminals with A Soldering Iron.**


Disconnect lead wires

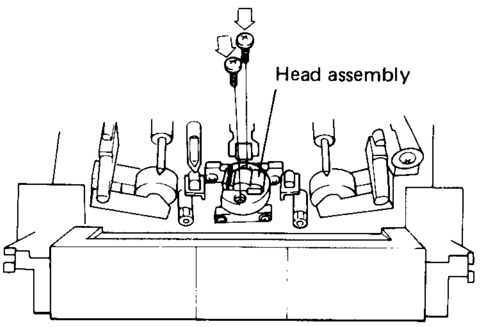
7. **Remove The Assist Motor from The Bracket**


Assist motor
Bracket

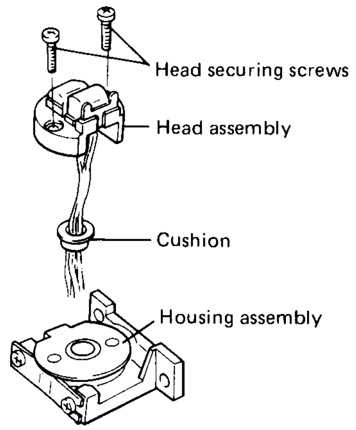
8. **Remove The Shield Plate from The Old Motor And Wind And Secure It onto A New Motor.**
9. **Mount The New Motor into The Bracket.**
10. **Apply Grease to The Worm Gear And to The End of Motor Axle.**
11. **Reassemble in The Reverse Order (Reversing The Operations in Steps 6 thru 1).**

3.6 HEAD REPLACEMENT

1. **Remove The Tape Transport Units from The Chassis** (See pages 6 thru 8.)
2. **Undo The Screws Securing The Head, And Remove The Head Assembly**



3. **Remove The Cushion from The Lead Wires, And Then Pass Lead Wires from A New Head Through The Cushion (Making Sure That The Leads Are Passed in The Right Direction)**



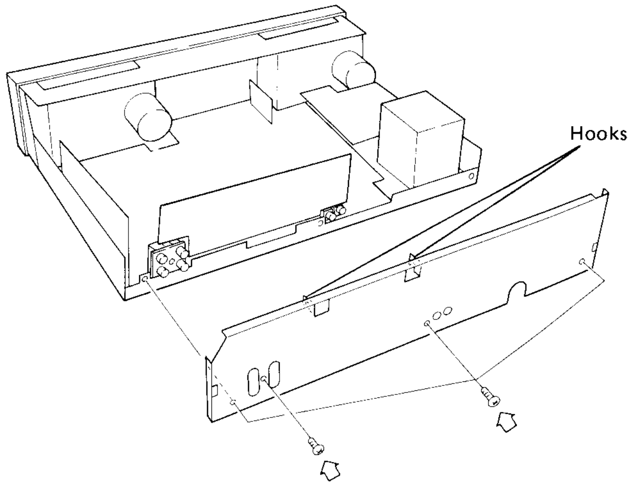
4. **Reassembly in The Reverse Order.**
5. **Proceed with Tape Transport And Electrical Adjustments**

Note: Always seal the head securing screws after the head has been replaced.

3.7 DISASSEMBLY OF THE MAIN UNIT

1. **Remove The Bonnet**
   (See page 6.)
2. **Remove The Rear Panel**

Undo the three setscrews in the rear panel and a setscrew securing the 4-pin jack. Then release the rear panel hooks from the Dolby unit and remove the panel by lifting up.

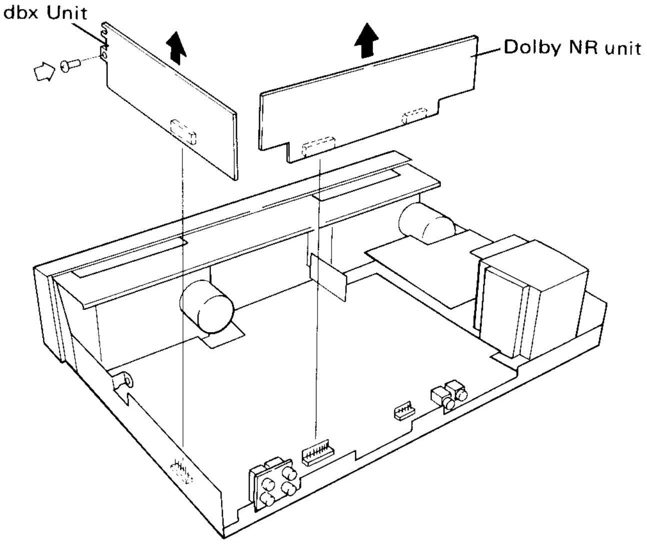


3. **Remove The Dolby NR Unit**

Although the Dolby NR unit does not always have to be removed, it may tend to get in the way during other operations it not removed.

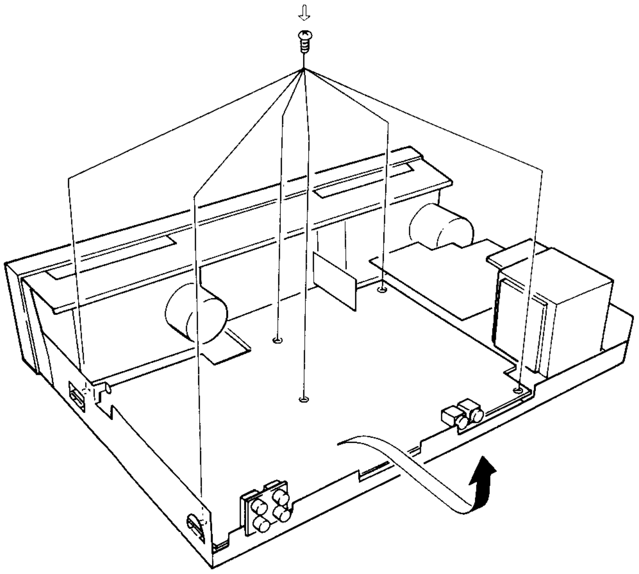
4. **Remove The dbx Unit**

Undo the one setscrew to remove the dbx unit.

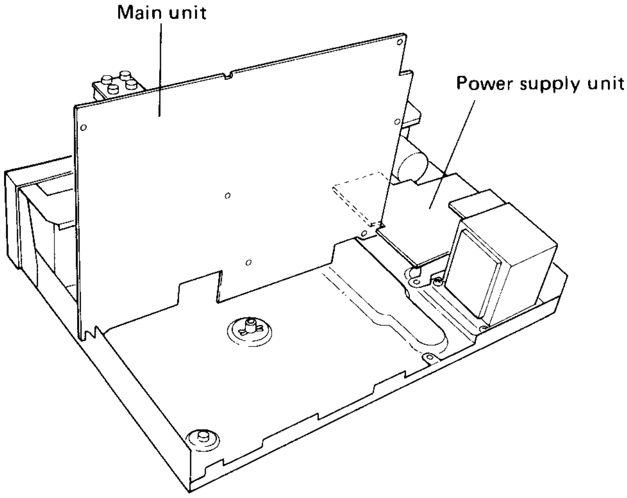


5. Remove The Main Unit

Undo six set screws to remove the main unit (by pulling to the rear).



Stand The Main Unit Upright by Inserting It into The Slots in The Side of The Chassis And in The Power Supply Unit.



3.8 DISASSEMBLY OF THE DISPLAY UNIT

1. Remove The Bonnet

(See page 6.)

2. Remove The Doors

(See page 7.)

3. Remove The Top Plate

(See page 7.)

4. Remove The Counter Belt

(See page 7.)

5. Remove The Front Panel

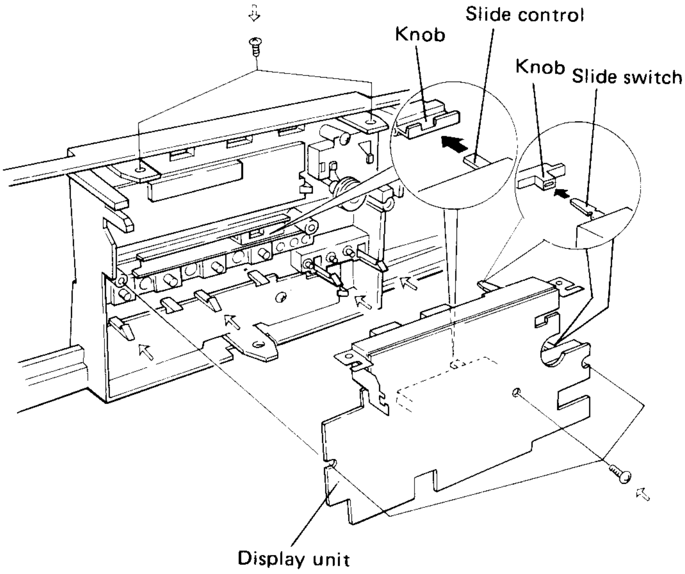
(See page 7.)

6. Remove The Display Unit

Pull the knobs (TIMER STD-BY, REVERSE MODE) out.

To remove the display unit, undo two setscrews at the top and three setscrews in the circuit board, and then disengage the four hooks projecting from the inside of the front panel.

Note:
When remounting the display unit, first align the slide control with the corresponding slot in the left or right hand position before pushing in, and always check the connection after the unit has been remounted.

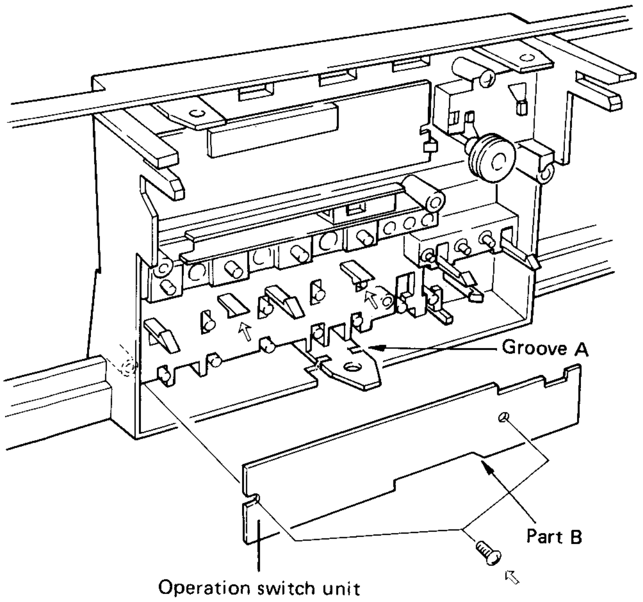


3.9 DISASSEMBLY OF THE OPERATION SWITCH UNIT

1. **Remove The Bonnet**
   (See page 6.)
2. **Remove the Doors**
   (See page 7.)
3. **Remove The Top Plate**
   (See page 7.)
4. **Remove The Counter Belt**
   (See page 7.)
5. **Remove The Front Panel**
   (See page 7.)
6. **Remove The Display Unit**
   (See page 12.)
7. **Remove The Operation Switch Unit**

Undo two setscrews and disengage the unit from two hooks in the rear of the front panel.

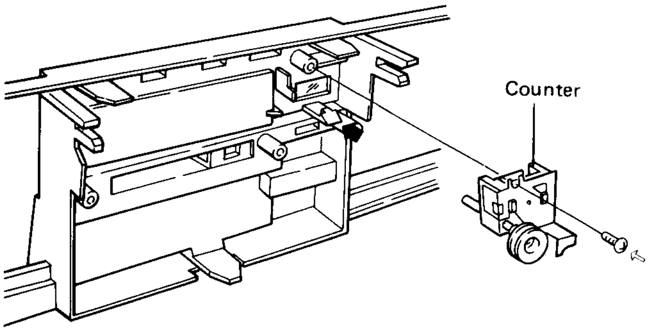
NOTE:
When remounting the operation switch unit, engage the groove A of the front panel with the part B of the operation switch unit.



3.10 DISASSEMBLY OF THE LEVEL METER ASSEMBLY

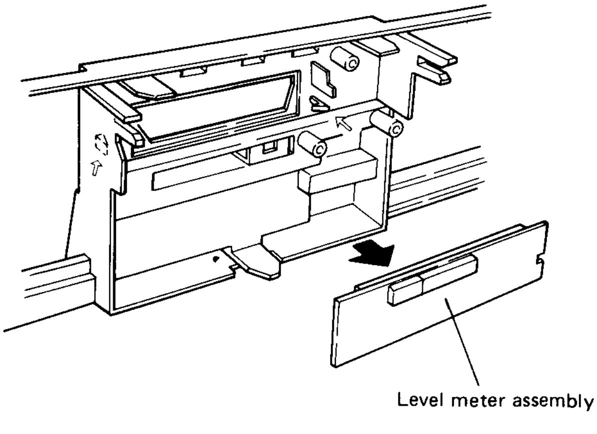
1. **Remove The Bonnet**
   (See page 6.)
2. **Remove The Doors**
   (See page 7.)
3. **Remove The Top Plate**
   (See page 7.)
4. **Remove The Counter Belt**
   (See page 7.)
5. **Remove The Front Panel**
   (See page 7.)
6. **Remove The Display Unit**
   (See page 12.)
7. **Remove The Counter**

Undo the setscrew and disengage the counter from the hook in the rear of the front panel.



8. **Remove The Level Meter Assembly**

Disengage the assembly from the hook in the rear of the front panel and from the hook on the side wall at the rear.

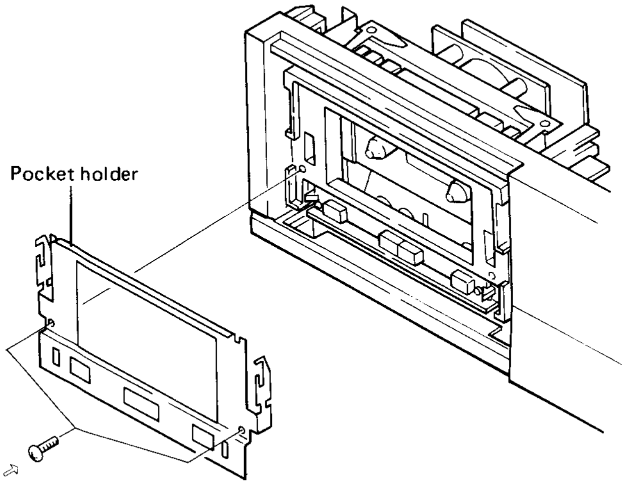


3.11 DISASSEMBLY OF THE DOOR INDICATOR UNIT

1. Remove The Doors
(See page 7.)

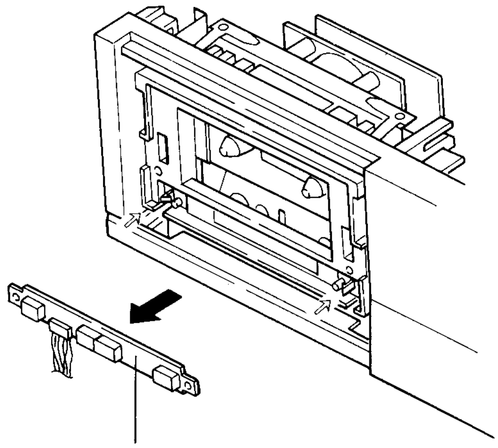
2. Remove The Pocket Holder

Undo the two setscrews, pull the holder forward and disengage it from the catches at the top.



3. Remove The Door Indicator Unit

Disengage the two hooks in the front of the door frame.



3.12 DISASSEMBLY OF THE BUTTON HOLDER

1. Remove The Bonnet
(See page 6.)

2. Remove The Doors
(See page 7.)

3. Remove The Top Plate
(See page 7.)

4. Remove The Counter Belt
(See page 7.)

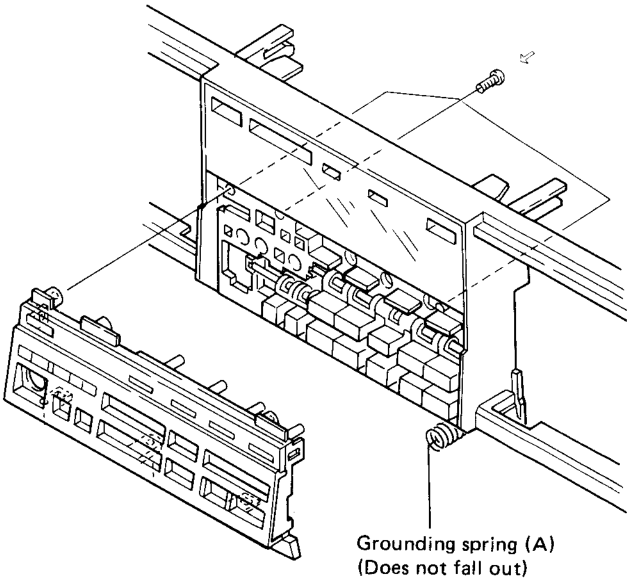
5. Remove The Front Panel
(See page 7.)

6. Remove The Display Unit
(See page 12.)

7. Remove The Operation Switch Unit
(See page 13.)

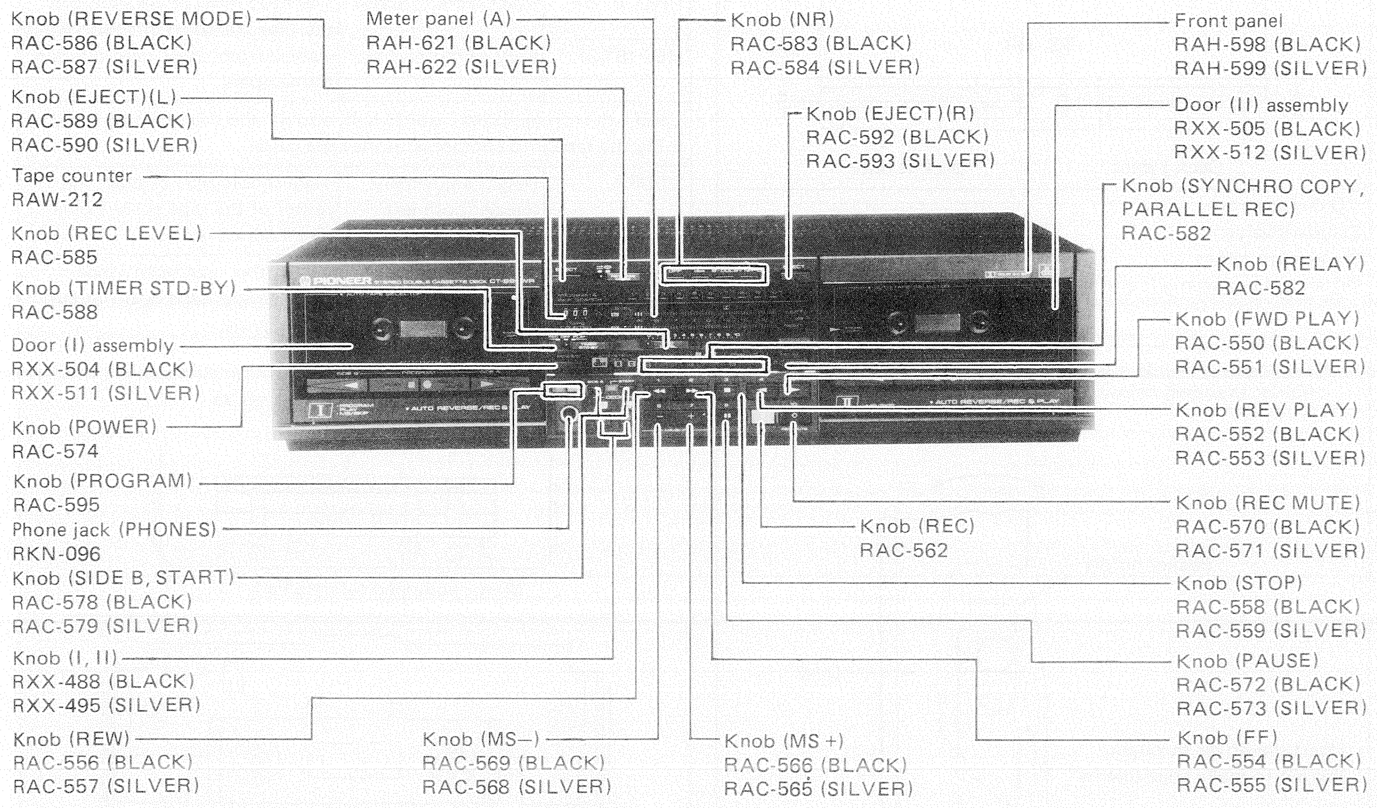
8. Remove The Button Holder

Undo the three screws from inside the front panel, and disengage the five hooks holding the holder from inside the front panel.

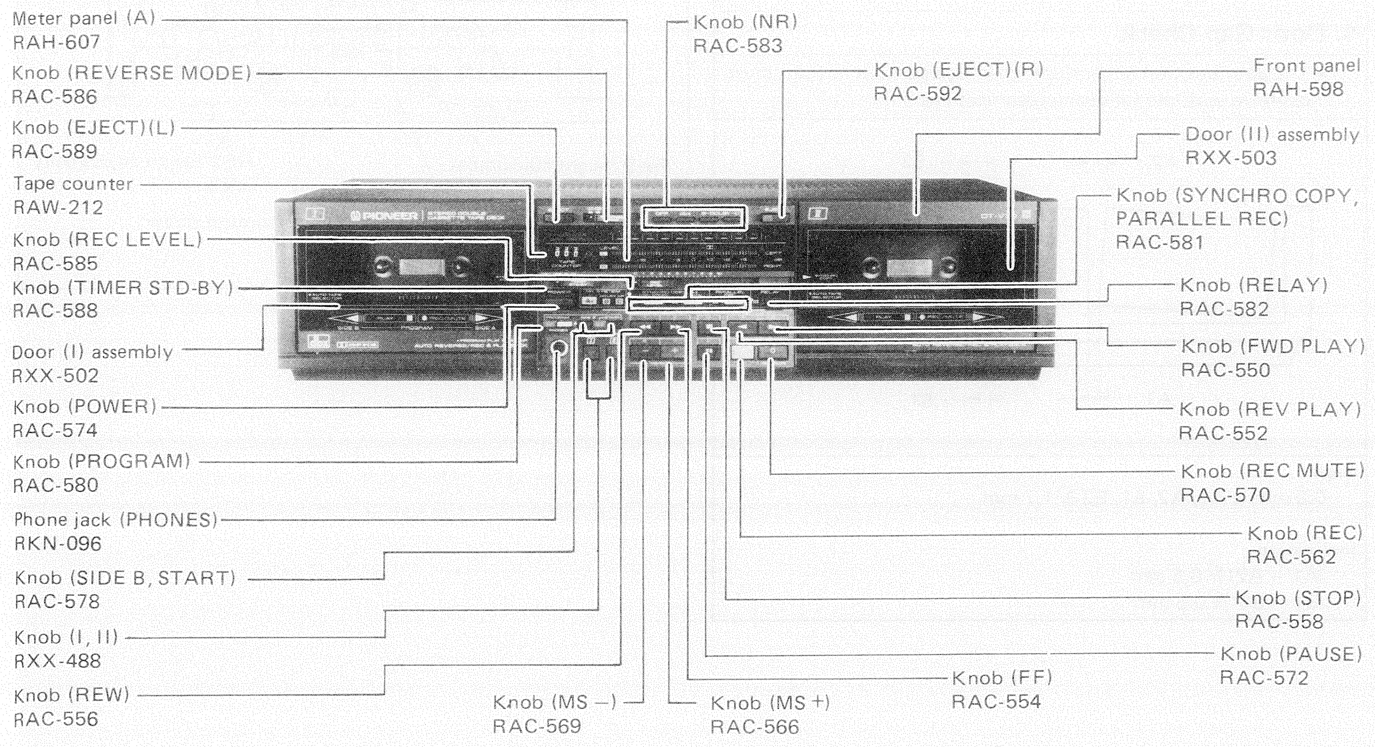


4. PARTS LOCATION

Front Panel View (CT-S99WR)

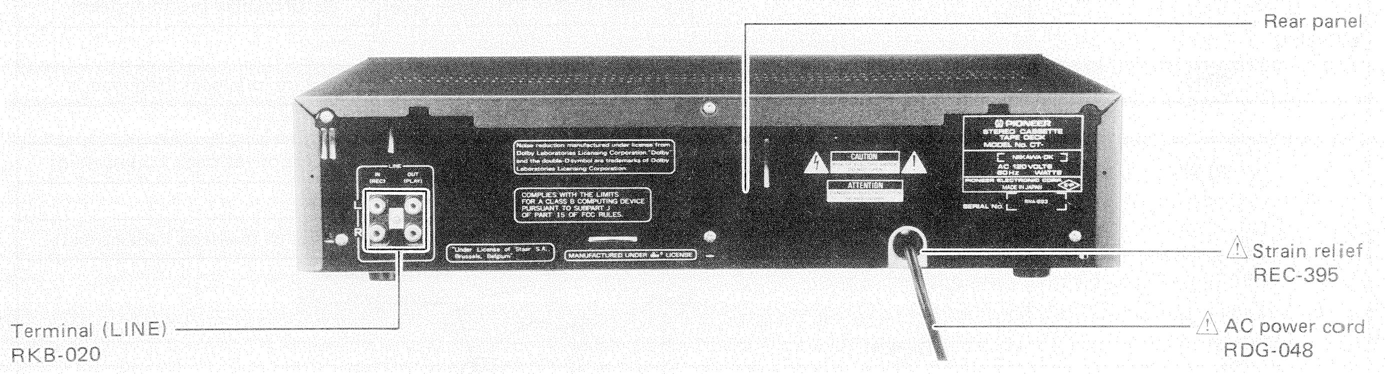

Knob (REVERSE MODE)
RAC-586 (BLACK)
RAC-587 (SILVER)
Knob (EJECT)(L)
RAC-589 (BLACK)
RAC-590 (SILVER)
Tape counter
RAW-212
Knob (REC LEVEL)
RAC-585
Knob (TIMER STD-BY)
RAC-588
Door (I) assembly
RXX-504 (BLACK)
RXX-511 (SILVER)
Knob (POWER)
RAC-574
Knob (PROGRAM)
RAC-595
Phone jack (PHONES)
RKN-096
Knob (SIDE B, START)
RAC-578 (BLACK)
RAC-579 (SILVER)
Knob (I, II)
RXX-488 (BLACK)
RXX-495 (SILVER)
Knob (REW)
RAC-556 (BLACK)
RAC-557 (SILVER)
Meter panel (A)
RAH-621 (BLACK)
RAH-622 (SILVER)
Knob (MS−)
RAC-569 (BLACK)
RAC-568 (SILVER)
Knob (NR)
RAC-583 (BLACK)
RAC-584 (SILVER)
Knob (EJECT)(R)
RAC-592 (BLACK)
RAC-593 (SILVER)
Knob (REC)
RAC-562
Knob (MS+)
RAC-566 (BLACK)
RAC-565 (SILVER)
Front panel
RAH-598 (BLACK)
RAH-599 (SILVER)
Door (II) assembly
RXX-505 (BLACK)
RXX-512 (SILVER)
Knob (SYNCHRO COPY, PARALLEL REC)
RAC-582
Knob (RELAY)
RAC-582
Knob (FWD PLAY)
RAC-550 (BLACK)
RAC-551 (SILVER)
Knob (REV PLAY)
RAC-552 (BLACK)
RAC-553 (SILVER)
Knob (REC MUTE)
RAC-570 (BLACK)
RAC-571 (SILVER)
Knob (STOP)
RAC-558 (BLACK)
RAC-559 (SILVER)
Knob (PAUSE)
RAC-572 (BLACK)
RAC-573 (SILVER)
Knob (FF)
RAC-554 (BLACK)
RAC-555 (SILVER)

Front Panel View (CT-V70)

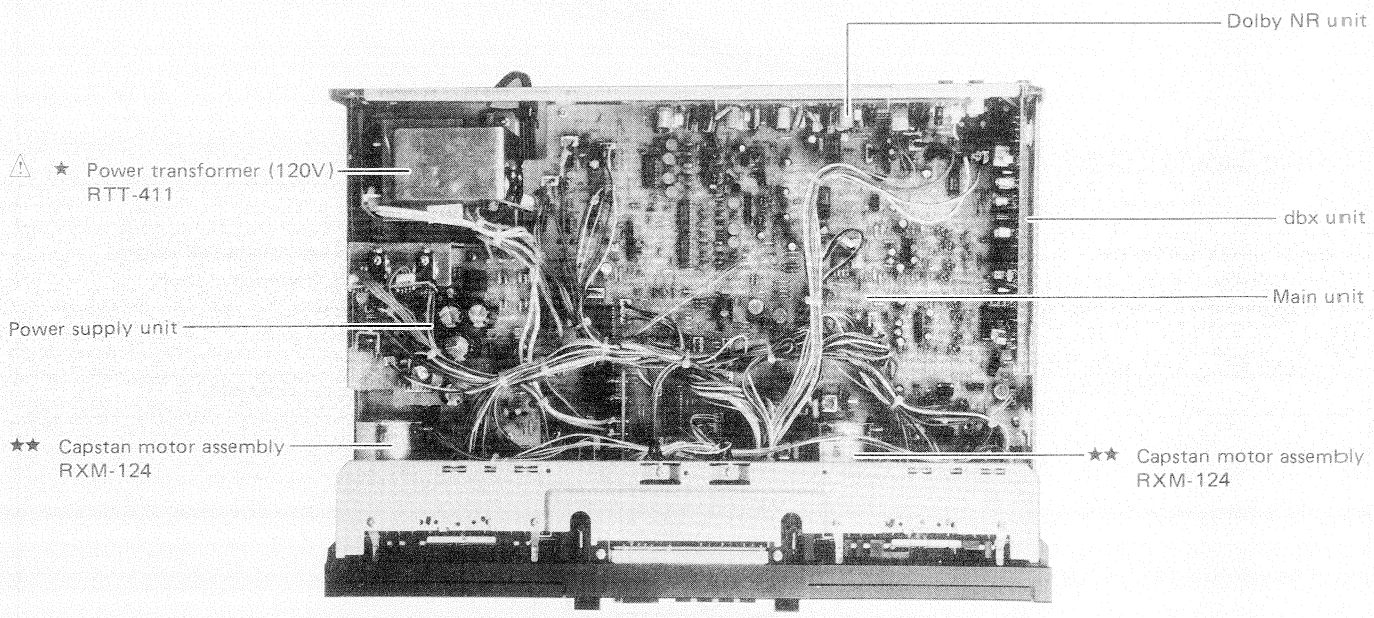

Meter panel (A)
RAH-607
Knob (REVERSE MODE)
RAC-586
Knob (EJECT)(L)
RAC-589
Tape counter
RAW-212
Knob (REC LEVEL)
RAC-585
Knob (TIMER STD-BY)
RAC-588
Door (I) assembly
RXX-502
Knob (POWER)
RAC-574
Knob (PROGRAM)
RAC-580
Phone jack (PHONES)
RKN-096
Knob (SIDE B, START)
RAC-578
Knob (I, II)
RXX-488
Knob (REW)
RAC-556
Knob (MS −)
RAC-569
Knob (NR)
RAC-583
Knob (MS +)
RAC-566
Knob (EJECT)(R)
RAC-592
Knob (FF)
RAC-554
Front panel
RAH-598
Door (II) assembly
RXX-503
Knob (SYNCHRO COPY, PARALLEL REC)
RAC-581
Knob (RELAY)
RAC-582
Knob (FWD PLAY)
RAC-550
Knob (REV PLAY)
RAC-552
Knob (REC MUTE)
RAC-570
Knob (REC)
RAC-562
Knob (STOP)
RAC-558
Knob (PAUSE)
RAC-572

- *Parts without part number cannot be supplied.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ GENERALLY MOVES FASTER THAN ★.
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

Rear Panel View (CT-S99WR)


Rear panel
⚠ Strain relief
REC-395
⚠ AC power cord
RDG-048
Terminal (LINE)
RKB-020

Top View


Dolby NR unit
⚠ ★ Power transformer (120V)
RTT-411
dbx unit
Main unit
Power supply unit
★★ Capstan motor assembly
RXM-124
★★ Capstan motor assembly
RXM-124

5. ADJUSTMENTS

5.1 MECHANICAL ADJUSTMENTS

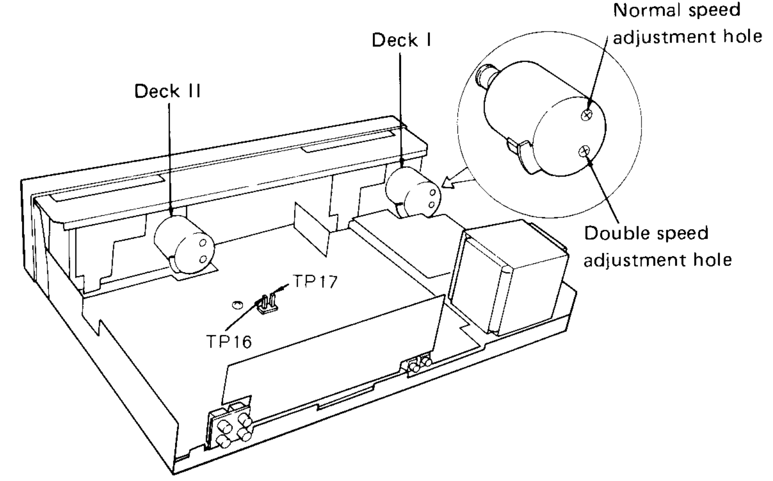
1. Tape Speed Adjustment Check

- Deck I

Mode	Test tape	Adjustment position	Rating (playback frequency)
PLAY	STD-301 (3kHz)	Short TP16 to TP17 after one minute of playback	
		Variable resistor VR (lower side)	6010Hz±10Hz (double speed)
		Remove short between TP16 and TP17	
		Variable resistor VR (upper side)	3010Hz±5Hz (normal speed)

- Deck II

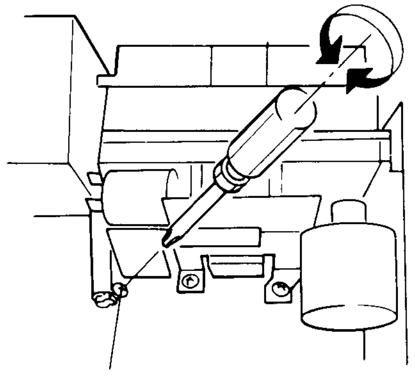
Mode	Test tape	Adjustment position	Rating (playback frequency)
PLAY	STD-301 (3kHz)	Short TP16 to TP17 after one minute of playback	
		Variable resistor VR (lower side)	±10Hz of the deck I adjustment
		Remove short between TP16 and TP17	
		Variable resistor VR (upper side)	±5Hz of the deck I adjustment


Normal speed adjustment hole
Deck I
Deck II
Double speed adjustment hole
TP17
TP16

2. Door Damping Check And Adjustment

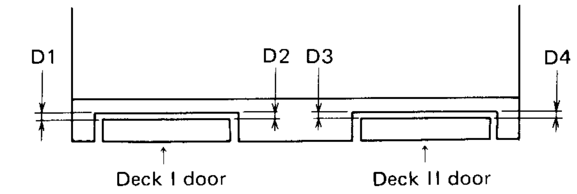
Adjustment position	Specifications
Cylinder adjustment screw Turn clockwise if door "bounces" Turn counter clockwise if door opens in two steps	Pressing the EJECT buttons for decks I and II with no cassette half loaded, the respective doors should open smoothly without "two-step" action and without rebounding at the fully opened position.

<Reference> Door opening time 0.8 sec ±0.3 sec (normal temperature)
Difference between decks 1 and II – less than 16 mm (approx) when doors fully open (normal temperature)


Adjustment screw

3. Door Position Check And Adjustment

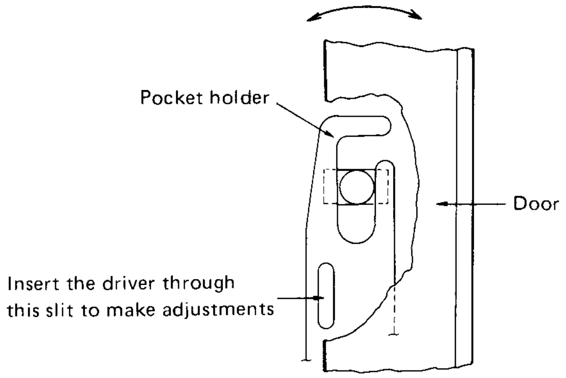
- The door position dimensions when viewed from above must conform with the following specifications.


D1
D2
D3
D4
Deck I door
Deck II door

<D dimensions>

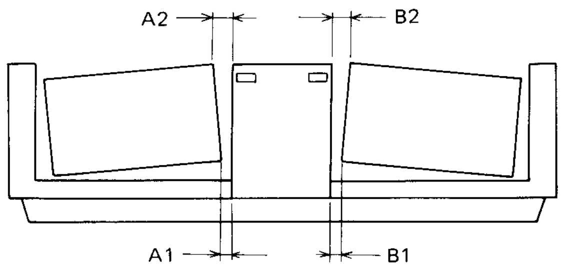
Standard value	1.2 mm
Permissible values	0.9 thru 1.7 mm
Difference between left and right	|D1 – D2| <0.4 mm |D3 – D4| <0.4 mm

- If the above ratings are not satisfied, adjust bending the pocket holder as shown below.


Pocket holder
Door
Insert the driver through this slit to make adjustments

4. Door Gap Check

- The door position dimensions when viewed from in front must conform with the following specifications.



Gaps
0.8 mm ≦ A1, A2, B1, B2 ≦ 1.7 mm

Inclination
|A1 – A2| ≦ 0.5 mm
|B1 – B2| ≦ 0.5 mm

5. Tape Transport Adjustment

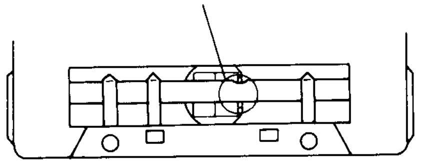
(remove cassette doors and door indicator units)

Mode	Adjustment location	Specifications
FWD STOP	FWD azimuth screw	The head must be parallel with the tape transport direction when viewed from above with the door frame open.
REV STOP	REV azimuth screw	

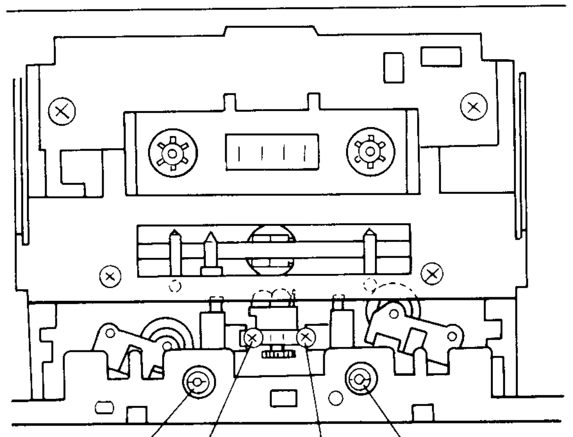
Load a mirror-equipped cassette half, and lift the head base by hand to bring the tape into contact with the tape guide.

STOP	Height adjustment screws (both left and right)	Tape should pass through the center of the tape guide (rough visual adjustment).
FWD PLAY	Left height adjustment screw	Adjust the "upstream" tape guide so that tape does not curl at the guide.
REV PLAY	Right height adjustment screw	

Eliminate curling at the head guide

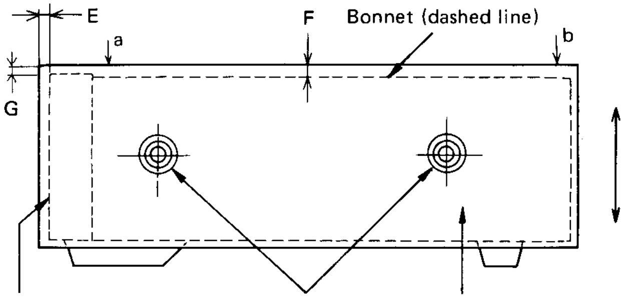


Mirror-equipped cassette half


FWD height adjustment screw
REV height adjustment screw
FWD azimuth screw
REV azimuth screw

6 Side Wood Panel Position Check & Adjustment
(CT-S99WR/D/G only)

- Dimensions for the side wood panels as seen from the sides must conform with the following specifications.



E dimension . . . . 1±0.5 mm
Inclination (sections c and d) |Ec − Eb| <0.5 mm
F dimension . . . . 1.5±0.5 mm
Inclination (sections a and b) |Fa − Fb| <0.5 mm
G dimension . . . . 0 − 2 mm

- If the above dimension limits are not satisfied, loosen the two setscrews and shift the panel up/down left/right by appropriate amounts before retightening the screws.

- The left hand panel is adjusted in the same way.

7. Playback Mode Eject Check

- The tape decks should not stop when the EJECT button is pressed (taking up the slackness in the thrust direction) during playback mode.
- The tape decks should not stop when the set is dropped from a height of 5 cm with the front panel, and then the two sides facing down.

5.2 ELECTRICAL ADJUSTMENTS

Pre-requisites for Electrical Adjustments

1. All mechanical adjustments must have been completed.
2. The heads must be cleaned and demagnetized.
3. Let the set warm up for several minutes before starting.
4. Set signal level to 0dBv=1Vrms.
5. Connect a 50 kohm (47 to 52 kohms permissible) load resistance across the output terminals.
6. Leave all DOLBY NR and dbx switches off unless specified otherwise.

Test Tapes

Playback system adjustments	: STD-331B (see Fig. 5-1)
NORMAL blank tape	: STD-608A
CrO2 blank tape	: STD-603
METAL blank tape	: STD-610

List of Adjustments

- Deck I playback system
1. Head azimuth adjustment
2. Playback equalizer adjustment
3. Time constant switching check
4. Playback level adjustment

- Deck II playback system
1. Head azimuth adjustment
2. Playback equalizer adjustment
3. Time constant switching check
4. Playback level adjustment

- Recording system
1. Bias oscillator adjustment
2. Erase current adjustment
3. Recording/playback frequency response adjustment
4. Recording level adjustment
5. Copy mode frequency response check
6. Simultaneous recording mode frequency response check
7. Leader tape detection operation adjustment
8. Level meter 0dB check
9. dbx system recovery time adjustment

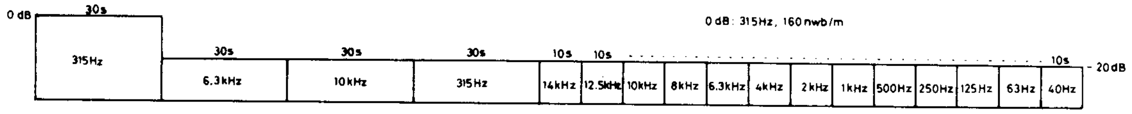

0 dB
30s
315Hz
30s
6.3kHz
30s
10kHz
30s
315Hz
10s
14kHz
10s
12.5kHz
10kHz
8kHz
6.3kHz
4kHz
2kHz
1kHz
500Hz
250Hz
125Hz
63Hz
10s
40Hz
- 20dB
0 dB: 315Hz, 160nwb/m

Fig. 5-1 STD-331B test tape

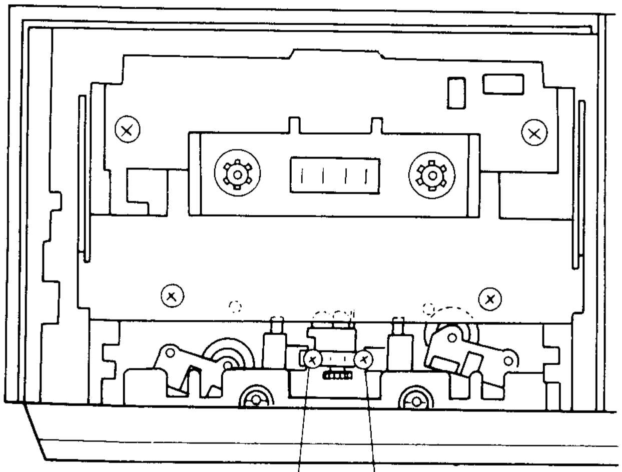

FWD azimuth screw
REV azimuth screw

Fig. 5-2 Head azimuth adjustment

Test tape	STD-331B
DOLBY NR switch	OFF

- Right channel is compensated by −0.5dB at 125Hz and by −1dB at 63 Hz because of the edge effect.

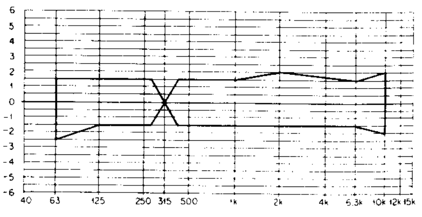


Fig. 5-3 Playback frequency response permissible zone

Deck I Playback System

1. Head azimuth adjustment

- Adjust V102 and V202 to maximum positions, and V101 and V201 to mechanical center positions.

	Mode	Input signal & test tape	Adjustment position	Measuring position	Adjustment value	Remarks
1	FWD-PLAY	Play the 10kHz/–20dB portion of the STD-331B test tape	FWD azimuth screw (Fig. 5-2)	Left and right line output terminals	Maximum playback signal level	
2	REV-PLAY		REV azimuth screw (Fig. 5-2)			

2. Playback equalizer adjustment

	Mode	Input signal & test tape	Adjustment position	Measuring position	Adjustment value	Remarks
1	FWD-PLAY	Play the 315Hz and 6.3kHz/–20dB portion of the STD-331B test tape	V101 (L ch) V201 (R ch)	Left and right line output terminals	Adjust the 6.3kHz level to 0dB in respect to the 315Hz playback level	±0.5dB variation permissible
2	FWD/REV-PLAY	Play various frequencies at –20dB on the STD-331B test tape	Check		The results must lie in the zone shown in Fig. 5-3.	

3. Time constant switching check

- Put the deck into playback mode with no tape loaded, and switch the CrO_2 tape detector switch (in top of the tape transport unit) on and off. Check that the noise level at the line output terminals is changed by this switching.

4. Playback level adjustment

- Execute this adjustment carefully since the result is used in setting the Dolby NR level.

	Mode	Input signal & test tape	Adjustment position	Measuring position	Adjustment value	Remakrs
	FWD-PLAY	Play the 315Hz/0dB portion of the STD-331B tes tape	V102 (L ch)	TP (DOL.L) (*)	–7.7dBv (412.1mV)	
			V202 (R ch)	TP (DOL. R) (*)		

* DOL.L is the right hand lead wire at C711, and DOL.R is the upper lead wire at C737.

Deck II Playback System

1. Head azimuth adjustment

- Adjust V104 and V204 to maximum positions, and V103 and V203 to mechanical center positions.

	Mode	Input signal & test tape	Adjustment position	Measuring position	Adjustment value	Remarks
1	FWD-PLAY	Play the 10kHz/–20dB portion of the STD-331B test tape	FWD azimuth screw (Fig. 5-2)	Left and right line output terminals	Maximum playback signal level	
2	REV-PLAY		REV azimuth screw (Fig. 5-2)			

2. Playback equalizer adjustment

	Mode	Input signal & test tape	Adjustment position	Measuring position	Adjustment value	Remarks
1	FWD-PLAY	Play the 315Hz and 6.3kHz/–20dB portion of the STD-331B test tape	V103 (L ch) V203 (R ch)	Left and right line output terminals	Adjust the 6.3kHz level to 0dB in respect to the 315Hz playback level	±0.5dB variation permissible
2	FWD/REV-PLAY	Play various frequencies at –20dB on the STD-331B test tape	Check		The results must lie in the zone shown in Fig. 5-3.	

3. Time constant switching check

- Put the deck into playback mode with no tape loaded, and switch the CrO_2 tape detector switch (in top of the tape transport unit) on and off. Check that the noise level at the line output terminals is changed by this switching.

4. Playback level adjustment

- Execute this adjustment carefully since the result is used in setting the Dolby NR level.

	Mode	Input signal & test tape	Adjustment position	Measuring position	Adjustment value	Remarks
	FWD-PLAY	Play the 315Hz/0dB portion of the STD-331B tes tape	V104 (L ch)	TP (DOL.L) (*)	–7.7dBv (412.1mV)	
			V204 (R ch)	TP (DOL. R) (*)		

* DOL.L is the right hand lead wire at C711, and DOL.R is the upper lead wire at C737.

Recording System

1. Bias oscillator adjustment

	Mode	Input signal & test tape	Adjustment posision		Measuring position	Adjustment value	Remarks
	REC	Load the STD-610 test tape with no input signal	Deck I	L301	TP11(I-IE)	Maximum output (maximum AC voltage)	Adjust the bias oscillator with checks set to recording mode simultaneously.
			Deck II	L302	TP11(II-IE)		

2. Erase current adjustment

	Mode	Input signal & test tape	Adjustment position		Measuring position	Adjustment value	Remarks
	REC	Load the STD-610 test tape with no inpu signal	Deck I	V301	TP11(I-IE)	160mV AC	Adjust the bias oscillator with decks I and II set to recording mode indenpendently.
			Deck II	V302	TP11(II-IE)		

3. Recording and playback frequency response adjustment

- Leave the DOLBY NR switch off.

	Mode	Input signal & test tape	Adjustment position		Measuring position	Adjustment value	Remarks
1	REC/ PAUSE	Apply a 315Hz/–30dBv signal to the line input terminals and load the STD-608A test tape.	REC LEVEL controls		Left and right line output terminals	–27.7dBv (41.2mV)	
2	FWD REC→ PLAY	Record and play 315Hz and 6.3kHz signals at an input level of –30dBv.	DeckI	V107(L) V207(R)		Adjust through repeated record/ playback cycles to obtain a 6.3kHz playback level of +1.0dB in respect to the 315Hz signal.	Adjust with decks I and II set to recording mode independently. Variations from +0.5dB to +1.5dB are permissible.
			DeckII	V108(L) V208(R)			
3	REC →PLAY	With an input level of +30dBv record and play signals from 63Hz to 12kHz).	Check			Specifications for FWD and REV, and DOLBY NR OFF and ON (types B and C) (see Fig. 5-5) must be satisfied (for both FWD and REV).	
4	If the specifications are not satisfied (including the following checks), readjust the 6.3kHz playback level to within –0.5dB and +2.5dB in respect to the 315Hz signal in step 2.						
5	Repeat the step 3 check using the STD-603 test tape. The specifications shown in Fig. 5-6 are to be satisfeied.						
6	Repeat the step 3 check using the STD-610 test tape. The specifications shown in Fig. 5-7 are to be satisfeied.						
7	After completing the adjustment, check the distortion and ensure against "under bias".						

4. Recording level adjustment

- Leave the DOLBY NR switch off.

	Mode	Input signal & test tape	Adjustment position		Measuring position	Adjustment value	Remarks
1	REC/ PAUSE	Apply a 315Hz/–10dBv signal to the line input terminals, and load the STD-608A test tape.	REC LEVEL controls		TP(DOL.L) TP(DOL.R)	–7.7dBv (412.1mV)	
2	REC →PLAY	Record and play the 315Hz/ –10dBv signal.	DeckI	V105(L) V205(R)		Adjust through repeated record/ playback cycles until a playback signal level of –7.7dBv (412mV) is obtained.	Adjust with decks I and II set to recording mode independently.
			DeckII	V106(L) V206(R)			
3	REC →PLAY	Record and play the 315Hz/ –10dBv signal on STD-603.	Check			–7.7±1.5dBv	
4	REC →PLAY	Record and play the 315Hz/ –10dBv signal on STD-610.	Check			–7.7±1.5dBv	

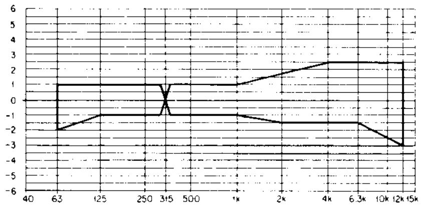
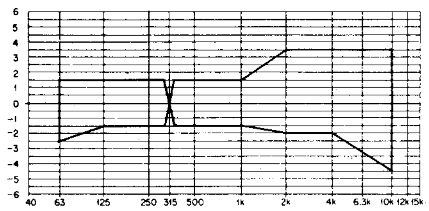
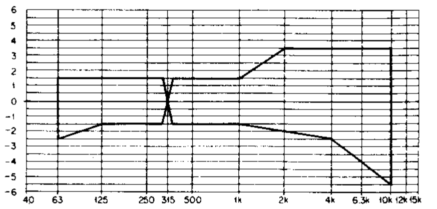
Test tape : STD-608A (NORM)		
DOLBY NR switch : OFF	DOLBY NR switch : ON (type B)	DOLBY NR switch : ON (type C)
		

Fig. 5-5 Recording & playback frequency response permissible zones (NORM)

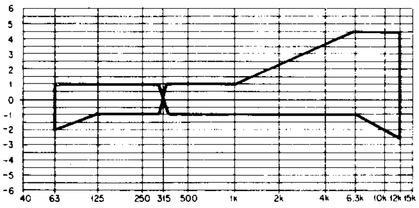
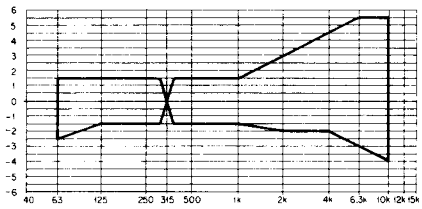
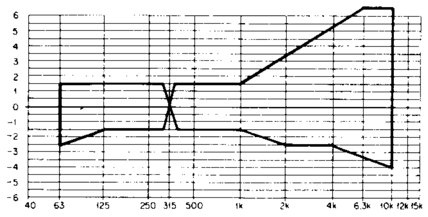
Test tape : STD-603 (CrO_2)		
DOLBY NR switch : OFF	DOLBY NR switch : ON (type B)	DOLBY NR switch : ON (type C)
		

Fig. 5-6 Recording & playback frequency response permissible zones (CrO_2)

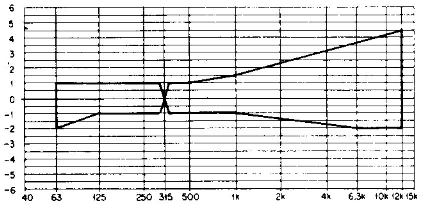
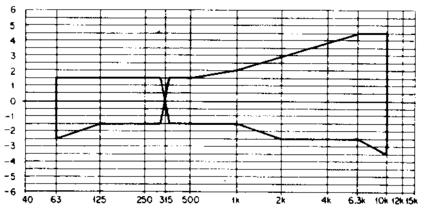
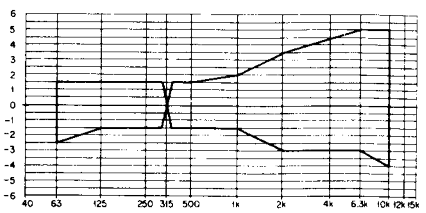
Test tape : STD-610 (METAL)		
DOLBY NR switch : OFF	DOLBY NR switch : ON (type B)	DOLBY NR switch : ON (type C)
		

Fig. 5-7 Recording & playback frequency response permissible zones (METAL)

5. Copy Mode Frequency Response Check

- Execute this check after all other adjustments have been completed.

	Mode	Input signal & test tape	Adjustment position	Measuring position	Adjustment value	Remarks
1	COPY & HIGH SPEED COPY	Load STD-331B in deck I, and STD-608A in deck II.				Copy STD-331B signal onto STD-608A (at normal and (double speeds).
2	Playback (deck II)	Play the signal recorded on STD-608A in the previous step.	Check	Left and right line output terminals	Specifications shown in Fig. 5-8 are to be satisfied. (Reference specifications)	
3	Load STD-603 into deck II, repeat steps 1 and 2, and check that the Fig. 5-8 specifications have been satisfied.					
4	Load STD-610 into deck II, repeat steps 1 and 2, and check that the Fig. 5-8 specifications have been satisfied.					

6. Simultaneous Recording Mode (PARALLEL REC) frequency response check

- Leave the DOLBY NR switch off.

	Mode	Input signal & test tape	Adjustment position	Measuring position	Adjustment value	Remarks
1	REC/ PAUSE	Apply a 315Hz/–30dBv signal to the line input terminals, and load the STD-608A test tape.	REC LEVEL controls	Left and right line output terminals	–27.7dBv (41.2mV)	
2	Simultaneous recording to playback	With an input level of –30dBv, record and play signals from 63Hz to 12kHz.	Check		Specifications for FWD and REV, and DOLBY NR OFF and ON (types B and C) (see Fig. 5-5) must be satisfied (for both FWD and REV).	
3	Repeat the step 2 check using the STD-603 test tape. The specifications shown in Fig. 5-6 are to be satisfied.					
4	Repeat the step 2 check using the STD-610 test tape. The specifications shown in Fig. 5-7 are to be satisfied.					

7. Leader tape detection operation adjustment

	Mode	Input signal & test tape	Adjustment position	Measuring position	Adjustment value	Remarks
1	PLAY	No input - load an empty cassette half.	Deck I V303 Deck II V304	TP12-I TP12-II	$1V^{+0.2}_{-0}V$	
2	• Check that he leader tape is correctly detected (in both FWD and REV directions when in endless reverse mode).					

8. Level Meter 0dB check

	Mode	Input signal & test tape	Adjustment position	Measuring position	Adjustment value	Remarks
	REC/ PAUSE	Apply a 315Hz signal to the line input terminals, and then vary the input level.	Check	TP (DOL.L) TP (DOL.R)	When the input level is increased, the level meter "0dB" position is to come on when the TP output is at –7.7dBv ±2dB.	

9. dbx system recovery time adjustment

	Mode	Input signal & test tape	Adjustment position	Measuring position	Adjustment value	Remarks
	STOP	None	V901	R957 terminals	DC15mV	

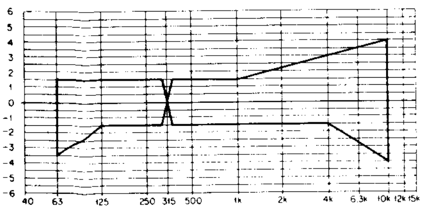
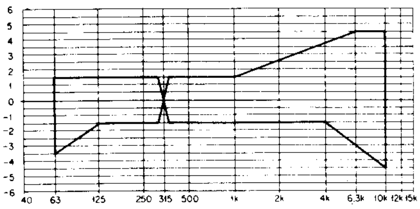
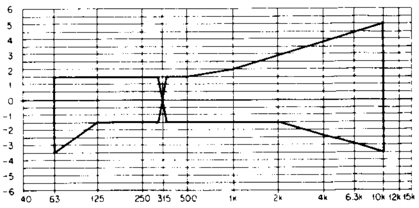
Test tape : STD-608A (NORM)	Test tape : STD-603 (CrO2)	Test tape : STD-610 (METAL)
DOLBY NR switch : OFF	DOLBY NR switch : OFF	DOLBY NR switch : OFF
		

Fig. 5-8 Copy mode frequency response (reference specifications)

Adjustments	Adjustment position			
	Deck I		Deck II	
	L ch.	R ch.	L ch.	R ch.
Playback equalizer	V101	V201	V103	V203
Playback level	V102	V202	V104	V204
Bias oscillator	L301		L302	
Erase current	V301		V302	
Recording level	V105	V205	V106	V206
Recording bias	V107	V207	V108	V208
Leader tape detection	V303		V304	
dbx system recovery time	V901			

- DOL.L is the right hand lead wire at C711, and DOL.R is the upper lead wire at C737

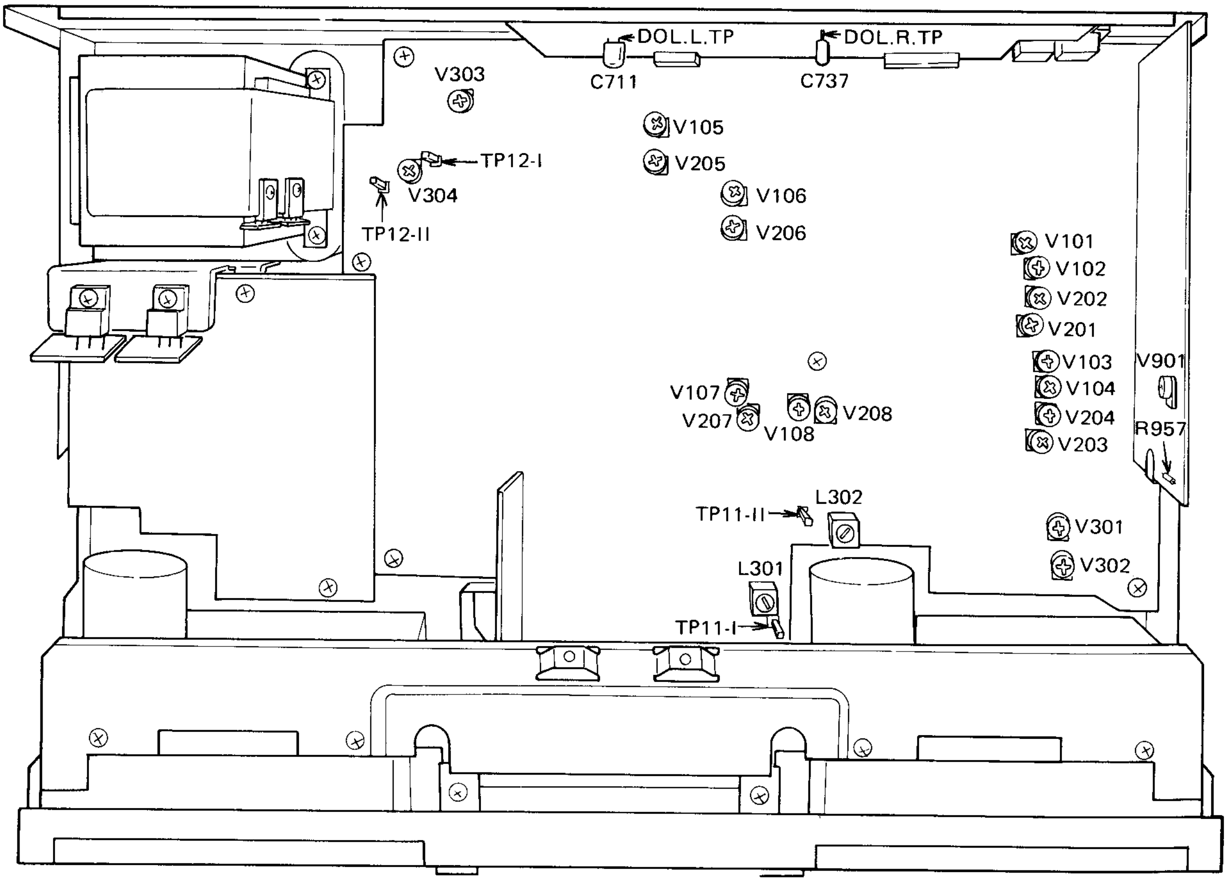

DOL.L.TP
DOL.R.TP
C711
C737
V303
V105
V205
TP12-I
V304
TP12-II
V106
V206
V101
V102
V202
V201
V103
V104
V204
V203
V901
R957
V107
V207
V108
V208
TP11-II
L302
L301
TP11-I
V301
V302

Fig. 5-9 Adjustment positions

5. RÉGLAGE

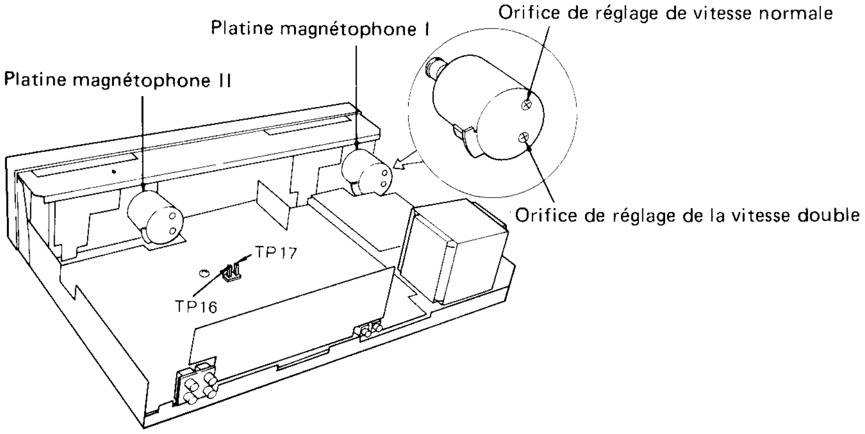
1. Réglage de la vitesse de défilement

- Platine magnétophone I

Mode	Bande d'étalonnage	Emplacement du réglage	Etalonnage caractéristique (fréquence de lecture)
LECTURE	STD-301 (3kHz)	Court-circuiter TP16 et TP17 après une minute de lecture	
		Résistance variable VR (section inférieure)	6010Hz±10Hz (double vitesse)
		Supprimer le court-circuit entre TP16 et TP17	
		Résistance variable VR (section supérieure)	3010Hz±5Hz (vitesse normale)

- Platine magnétophone II

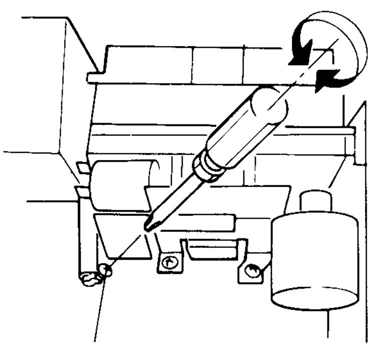
Mode	Bande d'étalonnage	Emplacement du réglage	Etalonnage caractéristique (fréquence de lecture)
LECTURE	STD-301 (3kHz)	Court-circuiter TP16 et TP17 après une minute de lecture	
		Résistance variable VR (section inférieure)	±10Hz du réglage de la platine magnétophone I
		Supprimer le court-circuit entre TP16 et TP17	
		Résistance variable VR (section supérieure)	±5Hz du réglage de la platine magnétophone I)


Orifice de réglage de vitesse normale
Platine magnétophone I
Platine magnétophone II
Orifice de réglage de la vitesse double
TP17
TP16

2. Contrôle et réglage d'amortissement de la trappe à cassette

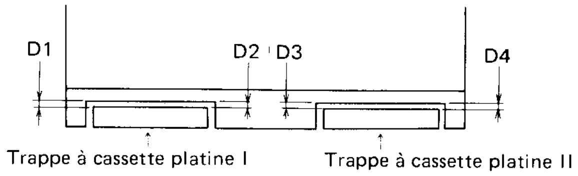
Emplacement du réglage	Caractéristiques
Vis de réglage de cylindre Si la trappe se dégage brutalement en arrière, tourner dans le sens des aiguilles d'une montre. Si la trappe se dégage en deux fois, tourner dans le sens contraire des aiguilles d'une montre.	Ouvrir la trappe à cassette des platines magnétophone I et II en pressant les touches EJECT (commandes d'éjection), mais sans présence de demi-cassette à l'intérieur; les trappes doivent s'ouvrir progressivement, sans à-coups, sans se dégager brutalement en arrière et en deux temps, jusqu'à l'ouverture totale et en une seule fois.

<Référence> Vitesse d'ouverture de trappe à la cassette: 0,8±0,3 sec. (à la température normale)
Différences entre les platines magnétophone I et II – inférieure à 16 mm (valeur approximative) lorsque les deux trappes à cassette sont complètement ouvertes (à la température normale)



3. Contrôle et réglage de positionnement de trappe à cassette

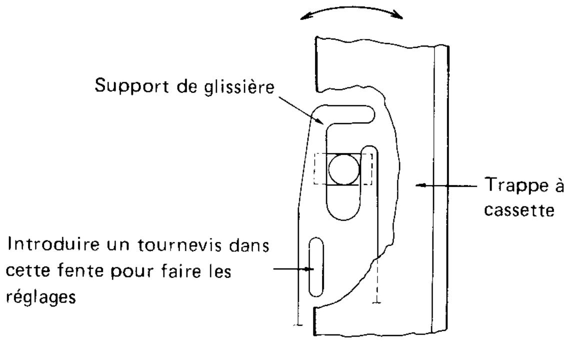
- Les dimensions de positionnement de la trappe sont conformes aux caractéristiques suivantes après inspection visuelle par dessus de la platine.



<D Dimensions>

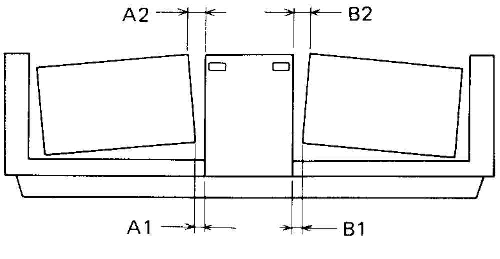
Valeur nominale:	1,2 mm
Tolérances:	0,9 à 1,7 mm
Différences la gauche et la droite:	$\lvert D1 - D2 \rvert < 0{,}4$ mm $\lvert D3 - D4 \rvert < 0{,}4$ mm

- Si les tolérances qui sont mentionnées ci-dessus ne sont pas satisfaites, ajuster en pliant le support de glissière de la valeur indiquée en procédant comme représenté sur le schéma ci-dessous.


Support de glissière
Trappe à cassette
Introduire un tournevis dans cette fente pour faire les réglages

4. Réglage d'écartement des trappes à cassette

- Les dimensions de positionnement des trappes à cassette sont conformes aux caractéristiques suivantes après inspection visuelle face aux platines magnétophone.



Ecartements

0,8 mm ≦ A1, A2, B1, B2 ≦ 1,7 mm

Inclinaision

$\lvert A1 - A2 \rvert \leqq 0{,}5$ mm

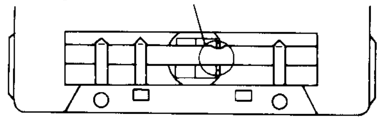
$\lvert B1 - B2 \rvert \leqq 0{,}5$ mm

5. Réglage du système de transport de bande

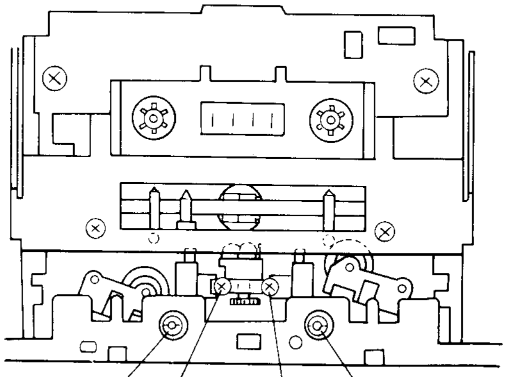
(retirer les trappes à cassette et les indicateurs de cassette)

Mode	Emplacement du réglage	Caractéristiques
Arrêt en défilement normal	Vis de réglage d'azimut en défilement normal	Lorsque le montant de la trappe à cassette est ouvert, la tête doit être parallèle au sens de défilement de la bande lorsqu'elle est regardée par-dessus.
Arrêt en défilement inverse	Vis de réglage d'azimut en défilement inverse	
Charger un demi-boftier de cassette équipé d'un miroir et relever l'embase de la tête à la main pour que la bande touche le guide de bande.		
Arrêt	Vis de réglage de hauteur (gauche et droite)	Contrôler (visuellement) si la bande est positionnée à la hauteur de la section centrale du guide de bande.
Lecture en défilement normal	Vis de réglage de hauteur gauche	Ajuster la position du premier guide de bande pour être certain que la bande ne forme pas de plis au niveau du guide.
Lecture en défilement inverse	Vis de réglage de hauteur droite	

Aucune formation de plis ne doit se produire à la hauteur du guide de bande



Demi-boftier de cassette équipé d'un miroir



Vis de réglage de hauteur en défilement normal

Vise de réglage d'azimut en défilement normal

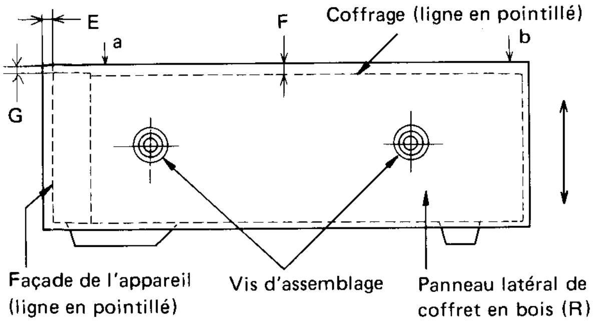
Vis de réglage de hauteur en défilement inverse

Vis de réglage d'azimut en défilement inverse

6. Réglage et contrôle de position du panneau latéral de coffret en bois

(uniquement sur les modèles de platines magnétophone CT-S99WR/D/G)

- Les dimensions des panneaux latéraux de coffret en bois vus de côté doivent être conforms aux caractéristiques suivantes.


E
F
Coffrage (ligne en pointillé)
a
b
G
Façade de l'appareil (ligne en pointillé)
Vis d'assemblage
Panneau latéral de coffret en bois (R)

Dimension E	1±0,5 mm
Inclinaison (sections c et d)	$|Ec - Eb| < 0,5$ mm
Dimension F	1,5±0,5 mm
Inclinaison (sections a et b)	$|Fa - Fb| < 0,5$ mm
Dimension G	0 à 2 mm

- Si les dimensions mentionnées ci-dessus ne sont pas satisfaites, desserrer le deux vis d'assemblage et dcaler le panneau dans le sens vertical ou dans le sens horizontal de la valeur nécessaire et resserrer les vis.

- La position du panneau placé du côté gauche peut être ajustée de la même façon.

7. Contrôler d'éjection en mode de lecture

- Les platines magnétophonene ne doivent pas s'arrêter lorsque leur touche EJECT est pressée (rattrapage du manque de tension de la bande dans la direction de la poussée) au cours du mode de lecture.
- Les platines magnétophonene ne doivent pas s'arrêter lorsque l'appareil est lâché d'une hauteur de 5 cm lorsque la façade est dirigée vers le sol puis lorsque les côtés sont tour à tour dirigés vers le sol.

5.2 RÉGLAGES ÉLECTRIQUES

Conditions nécessaires pour effectuer les réglages électriques

1. Tous les réglages des mécanismes doivent avoir été préalablement réalisés.
2. Les têtes magnétiques doivent être propres et démagnétisées.
3. Laisser chauffer les platines pendant quelques minutes avant de commencer à faire les réglages électriques.
4. Caler le niveau du signal de référence à 0dBv= 1V effi.
5. Raccorder une résistance de charge de 50K-ohms entre les bornes de sortie de ligne (les charges se trouvant dans les limites de 47K à 52K-ohms sont tolérées).
6. A moins d'une indication contraire, tous les commutateurs DOLBY NR et dbx doivent se trouver en position OFF.

Bandes d'étalonnage

Réglages des systèmes de lecture: STD-331B
(voir la Fig. 5-1)
Bande vierge ordinaire (NORMAL) : STD-608A
Bande vierge au chrome (CrO2) : STD-603
Bande vierge au fer (METAL) : STD-610

Liste des réglages à exécuter

- Système de lecture de platine magnétophone I
1. Réglage d'azimut de tête magnétique
2. Réglage de l'égalisateur de lecture
3. Réglage de commutation de constante de temps
4. Réglage du niveau de lecture

- Système de lecture de platine magnétophone II
1. Réglage d'azimut de tête magnétique
2. Réglage de l'égalisateur de lecture
3. Réglage de commutation de constante de temps
4. Réglage du niveau de lecture

- Système d'enregistrement
1. Réglage d'oscillateur de polarisation
2. Réglage du courant d'effacement
3. Calage de réponse en fréquence d'enregistrement et de lecture
4. Réglage du niveau d'enregistrement
5. Contrôle de réponse en fréquence du mode de duplication
6. Contrôle de réponse en fréquence du mode d'enregistrement simultané
7. Réglage de déroulement de la détection de la bandeamorce par microrécepteur
8. Réglage de durée de rétablissement du système dbx

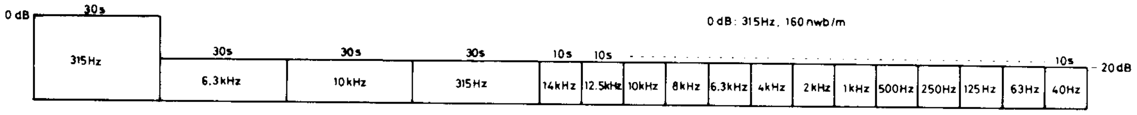

0 dB
30s
315Hz
0 dB: 315Hz, 160 nwb/m
30s
6.3kHz
30s
10kHz
30s
315Hz
10s
14kHz
10s
12.5kHz
10kHz
8kHz
6.3kHz
4kHz
2kHz
1kHz
500Hz
250Hz
125Hz
63Hz
10s
40Hz
- 20dB

Fig. 5-1 Bande d'étalonnage STD-331B

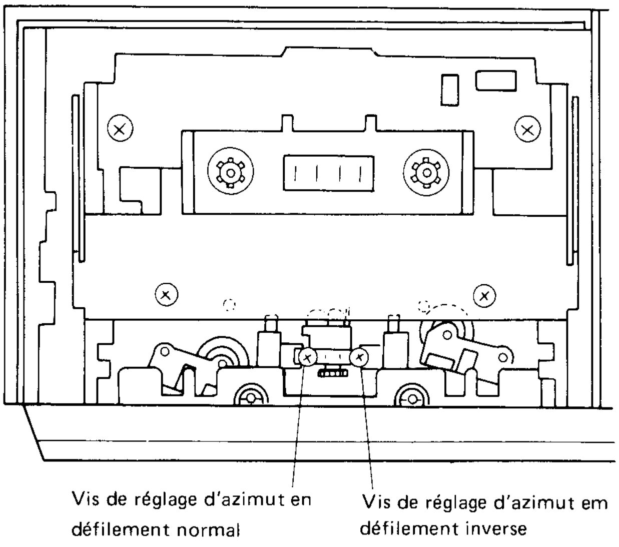

Vis de réglage d'azimut en défilement normal
Vis de réglage d'azimut em défilement inverse

Fig. 5-2 Vis de réglage d'azimut de tête

Bande d'etalonnage	STD-331B
Position du commutateur DOLBY NR	OFF

- Le canal droit est compensé de –0,5dB à 125Hz et de –1dB à 63Hz suite à l'effet marginal.

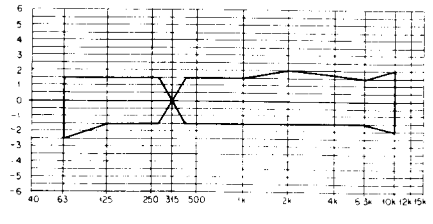


Fig. 5-3 Zone de tolérance de réponse en fréquence de lecture

Système de lecture de platine magnétophone I

1. Réglage d'azimut de tête magnétique

- Régler les résistances variables V102 et V202 de façon à obtenir des niveaux maximaux et les résistances variables V101 et V201 sur leur position mécanique centrale.

	Mode	Signal d'entrée appliqué et bande d'étalonnage	Emplacement du réglage	Emplacement de la borne d'étalonnage	Valeur relevée	Observations
1	DÉFILEMENT NORMAL-LECTURE	Lire le passage préenregistré de 10kHz/−20dB de la bande d'étalonnage STD-331B	Vis de réglage d'azimut de tête d'avance normale. (voir la figure 5-2)	Bornes de sortie de ligne droite et gauche	Niveau maximum du signal de lecture	
2	LECTURE-DÉFILEMENT INVERSE		Vis de réglage d'azimut de tête d'avance inverse. (voir la figure 5-2)			

2. Réglage de l'égalisateur de lecture

	Mode	Signal d'entrée appliqué et band d'étalonnage	Emplacement du réglage	Emplacement de la borne d'étallonnage	Valeur relevée	Observations
1	DÉFILEMENT NORMAL-LECTURE	Lire le passage préenregistré de 315Hz et de 6,3kHz/−20dB de la bande d'étalonnage STD-331B	V101 (canal gauche) V201 (canal droit)	Bornes de sortie de ligne droite et gauche	Ajuster le niveau de lecture de 6,3kHz à 0dB par rapport au niveau de lecture de 315Hz	±0,5dB d'écart admissible
2	DÉFILEMENT NORMAL-DÉFILEMENT INVERSE LECTURE	Lire plusieur sections de fréquence préenregistrées −20dB de la bande d'étalonnage STD-331B	Confirmer		Les résultats doivent se placer dans la zone représentée sur la figure 5-3	

3. Contrôle de commutation de constante de temps de lecture

- Placer la platine en mode de lecture sans présence de cassette, commuter le détecteur de bande CrO2 (en haut du système de transport de l'appareil) sur marche et arrêt. Vérifier si le niveau du bruit change aux bornes de sortie de lecture lorsque le sélecteur de bande au chrome installé à la partie supérieure du bloc de transport de bande est commuté en position de marche et d'arrêt.

4. Réglage du niveau de lecture

- Ce réglage servant à étalonner le niveau du DOLBY NR doit être exécuté avec une grande précision.

	Mode	Signal d'entrée appliqué et bande d'étalonnage	Emplacement du réglage	Emplacement de la borne d'étalonnage	Valeur relevée	Observations
1	DÉFILEMENT NORMAL-LECTURE	Lire le passage préenregistré de 315Hz/0dB de la bande d'étalonnage STD-331B	V102 (canal gauche) V202 (canal droit)	TP (DOL.L) (*) TP (DOL.R) (*)	−7,7dBv (412,1mV)	

* DOL.L est le fil de jonction droit à C711 et DOL.R est le fil de jonction supérieur à C737.

Système de lecture de platine magnétophone II

1. Réglage d'azimut de tête magnétique

- Régler les résistances variables V104 et V204 de façon à obtenir des niveaux maximaux et les résistances variables V103 et V203 sur leur position mécanique centrale.

	Mode	Signal d'entrée appliqué et bande d'étalonnage	Emplacement du réglage	Emplacement de la borne d'étalonnage	Valeur relevée	Observations
1	DÉFILEMENT NORMAL-LECTURE	Lire le passage préenregistré de 10kHz/−20dB de la bande d'étalonnage STD-331B	Vis de réglage d'azimut de tête d'avance normal. (voir la figure 5-2)	Bornes de sortie de ligne droite et gauche	Niveau maximum du signal de lecture	
2	LECTURE-DÉFILEMENT INVERSE		Vis de réglage d'azimut de tête d'avance inverse. (voir la figure 5-2)			

2. Réglage de l'égalisateur de lecture

	Mode	Signal d'entrée appliqué de bande d'étalonnage	Emplacement du réglage	Emplacement de la borne d'étalonnage	Valeur relevée	Observations
1	DÉFILEMENT NORMAL-LECTURE	Lire le passage préenregistré de 315Hz et de 6,3kHz/−20dB de la bande d'étalonnage STD-331B	V103 (canal gauche) V203 (canal droit)	Bornes de sortie de ligne droite et gauche	Ajuster le niveau de lecture de 6,3kHz à 0dB par rapport au niveau de lecture de 315Hz	±0,5dB d'écart admissible
2	DÉFILEMENT NORMAL-DÉFILEMENT INVERSE LECTURE	Lire plusieurs sections de fréquence préenregistrées −20dB de la bande d'étalonnage STD-331B	Confirmer		Les résultats doivent se placer dans la zone représentée sur la figure 5-3	

3. Contrôle de commutation de constante de temps de lecture

- Placer la platine en mode de lecture sans présence de cassette, commuter le détecteur de bande CrO2 (en haut du système de transport de l'appareil) sur marche et arrêt. Vérifier si le niveau du bruit change aux bornes de sortie de lecture lorsque le sélecteur de bande au chrome installé à la partie supérieure du bloc de transport de bande est commuté en position de marche et d'arrêt.

4. Réglage du niveau de lecture

- Ce réglage servant à étalonner le niveau du DOLBY NR doit être exécuté avec une grande précision.

	Mode	Signal d'entrée appliqué et bande d'étalonnage	Emplacement du réglage	Emplacement de la borne d'étalonnage	Valeur relevée	Observations
	DÉFILEMENT NORMAL-LECTURE	Lire le passage préenregistré de 315Hz/0dB de la bande d'étalonnage STD-331B	V104 (canal gauche) V204 (canal droit)	TP (DOL.L) (*) TP (DOL.R) (*)	−7,7dB (412,1mV)	

* DOL.L est le fil de jonction droit à C711 et DOL.R est le fil de jonction supérieur à C737.

Système d'enregistrement

1. Réglage de l'oscillateur de polarisation

	Mode	Signal d'entrée appliqué et bande d'étalonnage	Emplacement du réglage		Emplacement de la borne d'étalonnage	Valeur relevée	Observations
	ENREGISTREMENT	Charger la bande d'étalonnage STD-610 sans appliquer de signal d'entrée	Platine magnétophone I	L301	TP11 (I-IE)	Niveau de sortie maximum	Ajuster l'oscillateur de polarisation par des contrôles tout en réglant les platines magnétophone en mode d'enregistrement
			Platine magnetophone II	L302	TP11 (II-IE)		

2. Réglage du courant d'effacement

	Mode	Signal d'entrée appliqué et bande d'étalonnage	Emplacement du réglage		Emplacement de la borne d'étalonnage	Valeur relevée	Observations
	ENREGISTREMENT	Charger la bande d'étalonnage STD-610 sans appliquer de signal d'entrée	Platine magnétophone I	L301	TP11 (I-IE)	160mV AC	Ajuster l'oscillateur de polarisation par des contrôles tout en réglant indépendamment les platines magnétophone I et II en mode d'enregistrement
			Platine magnetophone II	L302	TP11 (II-IE)		

3. Réglage de réponse en fréquence de lecture et d'enregistrement

- Conserver le commutateur DOLBY NR en position OFF.

	Mode	Signal d'entrée appliqué et bande d'étalonnage	Emplacement du réglage		Emplacement de la borne d'étalonnage	Valeur relevée	Observations
1	PAUSE À L'ENREGISTREMENT	Appliquer en signal de 315Hz/ −30dB aux bornes d'entrée de ligne et charger la bande d'étalonnage STD-608A	Potentiomètre de niveau d'enregistrement		Bornes de sortie de ligne gauche et droite	−27,7dBv (41,2mV)	
2	DÉFILEMENT NORMAL - ENREGISTREMENT LECTURE	Enregistrer et lire les signaux de 315Hz et 6,3kHz au niveau d'entrée de −30dBv	Platine magnetophone I	V107(L) V207(R)		Obtenir un niveau de lecture de 6,3kHz est de +1,0dB par rapport au niveau de 315Hz en effectuant des essais successifs d'enregistrement et de lecture	Ajuster indépendamment les platines magnétophone I et II réglées en mode d'enregistrement. Les écarts doivent être de l'ordre de +0,5dB à +1,5dB
			Platine magnetophone II	V108(L) V208(R)			
3	ENREGISTREMENT-LECTURE	Enregistrer et lire les signaux de 63Hz à 12kHz avec un niveau d'entrée de +30dBv	Confirmer			Les caractéristiques des modes de défilement normal et de défilement inverse, lorsque le commutateur DOLBY NR est sur OFF et sur ON (types B et C) (voir la figure 5-5) doivent être satisfaites (pour les deux modes précités)	
4	Si les caractéristique ne sont pas satisfaites (les contrôles qui suivent compris), refaire le réglage de niveau de lecture de 6,3kHz pour obtenir un résultat dans les dans les limites spécifiées de −0,5dB et +2,5dB par rapport au niveau de 315Hz, comme indiqué à l'opération 2.						
5	Refaire le contrôle décrit dans l'opération 3 avec la bande d'etalonnage STD-603. Les caractéristiques indiquées par la figure 5-6 doivent être satisfaites.						
6	Refaire le contrôle décrit dans l'opération 3 avec la bande d'étalonnage STD-610. Les caractéristiques indiquées par la figure 5-7 doivent être satisfaites.						
7	Lorsque les réglages sont terminés, contrôler la distorsion et s'en assurer par rapport à la souspolarisation.						

4. Réglage du niveau d'enregistrement

- Conserver le commutateur DOLBY NR en position OFF.

	Mode	Signal d'entrée appliqué et bande d'étalonnage	Emplacement du réglage		Emplacement de la borne d'étalonnage	Valeur relvée	Observations
1	PAUSE À L'ENREGISTREMENT	Appliquer en signal de 315Hz/ −10dB aux bornes d'entrée de ligne et charger la bande d'étalonnage STD-608A	Potentiomètres de niveau d'enregistrement		TP(DOL.L) TP (DOL.R)	−7,7dBv (412,1mV)	
2	ENREGISTREMENT → LECTURE	Enregistrer et lire le signal de 315Hz au niveau d'entrée de −10dBv	Platine magnétophone I	V105(L) V205(R)		Obtenir un niveau de lecture de −7,7dBv (412mV) en effectuant des essais successifs d'enregistrement et de lecture	Ajuster indépendamment les platines magnétophone I et II réglées en mode enregistrement.
			Platine magnétophone II	V106(L) V206(R)			
3	ENREGISTREMENT → LECTURE	Enregistrer et lire le signal de 315Hz/−10dBv et charger la bande d'étalonnage STD-603	Confirmer			−7,7±1,5dBv	
4	ENREGISTREMENT → LECTURE	Enregistrer et lire le signal de 315/−10dBv et charger la bande d'étalonnage STD-610	Confirmer			−7,7±1,5dBv	

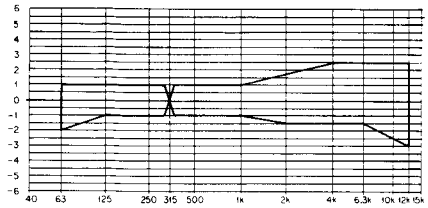
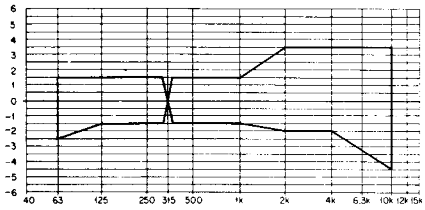
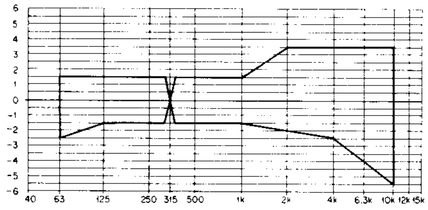
Bande d'étalonnage : STD-608A (NORM)		
Commutateur DOLBY NR : sur OFF	Commutateur DOLBY NR type-B : sur ON	Commutateur DOLBY NR type-C : sur ON
		

Fig. 5-5 Zones admissibles de réponse en fréquence d'enregistrement et de lecture (NORM)

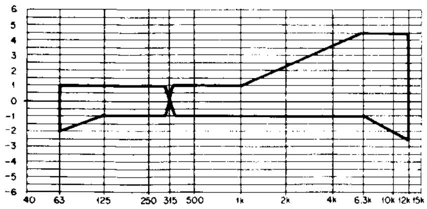
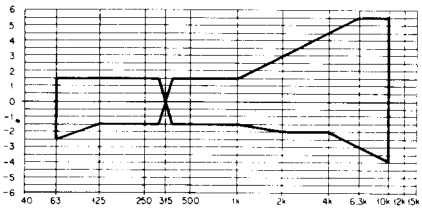
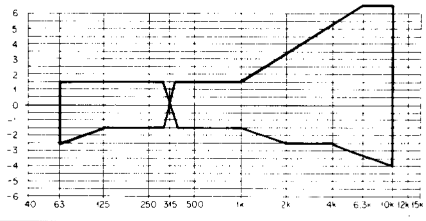
Bande d'étalonnage : STD-603 (CrO2)		
Commutateur DOLBY NR : sur OFF	Commutateur DOLBY NR type-B : sur ON	Commutateur DOLBY NR type-C : sur ON
		

Fig. 5-6 Zones admissibles de réponse en fréquence d'enregistrement et de lecture (CrO2)

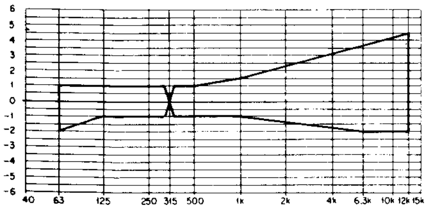
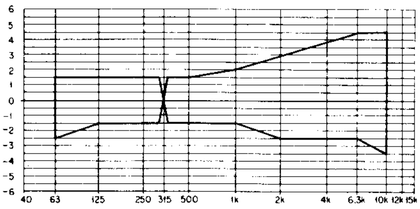
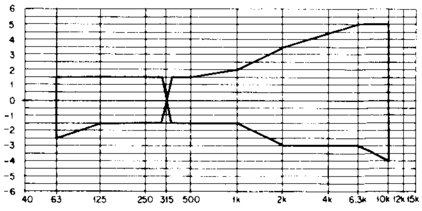
Bande d'étalonnage : STD-610 (METAL)		
Commutateur DOLBY NR : sur OFF	Commutateur DOLBY NR type-B : sur ON	Commutateur DOLBY NR type-C : sur ON
		

Fig. 5-7 Zones admissibles de réponse en fréquence d'enregistrement et de lecture (METAL)

5. Contrôle de réponse en fréquence de mode de duplication

- Ce contrôle doit être fait après que tous les autres réglages aient été terminés.

	Mode	Signal d'entrée appliqué et bande d'etalonnage	Emplacement du réglage	Emplacement de la borne d'étalonnage	Valeur relevée	Observations
1	DUPLICATION NORMAL ET DUPLICATION A GRANDE VITESSE	Charger la bande d'étalonnage STD-331B dans la platine I et la bande d'étalonnge STD-608A dans la platine II				Effectuer une copie du signal préenregistré sur la bande STD-331B sur la bande d'étalonnage STD-608A (à la vitesse normale et la vitesse double)
2	LECTURE (platine II)	Lire le signal préenregistré de la bande d'étalonnage STD-608A du réglage précédent	Confirmer	Bornes de sorite de ligne gauche et droite	Les valeurs d'etalonnage indiquées sur la figure 5-8 doivent être satisfaites. (Caractéristiques de référence)	
3	Charger la bande d'étalonnage STD-603 dans la platine magnétophone II, refaire les opérations 1 et 2 et contrôler si les caractéristiques indiquées par la figure 5-8 sont satisfaites.					
4	Charger la bande d'étalonnage STD-610 dans la platine magnétophone II, refaire les opérations 1 et 2 et contrôler si les caractéristiques indiquées par la figure 5-8 sont satisfaites.					

6. Contrôle de réponse en fréquence d'enregistrement simultané PARALLEL REC

- Conserver le commutateur DOLBY NR en position OFF.

	Mode	Signal d'entrée appliqué et bande d'etalonnage	Emplacement du réglage	Emplacement de la borne d'étalonnage	Valeur relevée	Observations
1	PAUSE A L'ENREGISTREMENT	Injecter un signal de 315Hz/ –30dBv par les bornes d'entrée de ligne après chargement de la bande d'étalonnage STD-608A	Potentiomètres de niveau d'enregistrement	Bornes de sortie de ligne gauche et droite	–27,7dBv (41,2mV)	
2	Mode d'enregistrement à lecture simultané	Avec un niveau d'entrée de –30dBv, enregistrer et lire des signaux de 63Hz à 12kHz	Confirmer		Les caractéristiques des modes de défilement normal et de défilement inverse, lorsque le commutateur DOLBY NR est sur OFF et sur ON (types B et C) (voir la figure 5-5) doivent être satisfaites (pour les deux modes précités)	
3	Utiliser la bande d'étalonnage STD-603 et répéter l'opération 2. Les caractéristique indiquées sur la figure 5-6 doivent être satisfaites.					
4	Utiliser la bande d'étalonnage STD-610 et répéter l'opération 2. Les caractéristique indiquées sur la figure 5-7 doivent être satisfaites.					

7. Réglage de fonctionnement de la détection de bande amorce

	Mode	Signal d'entrée appliqué et bande d'etalonnage	Emplacement du réglage	Emplacement de la borne d'étalonnage	Valeur relevée	Observations
1	LECTURE	Aucun signal est injecte. Mise en place de la demicassette	Platine magnétophone I V303	TP12-I	$1V^{+0,2}_{-0}V$	
			Platine magnétophone II V304	TP12-II		
2	• S'assurer que la bande amorce est correctement détectée (au cours des modes de défilement normal et de défilement inverse quand l'appareil est réglé en mode sans fin).					

8. Contrôle de calage à 0dB des décibelmètres

	Mode	Signal d'entrée appliqué et bande d'etalonnage	Emplacement du réglage	Emplacement de la borne d'étalonnage	Valeur relevée	Observations
	PAUSE A L'ENREGISTREMENT	Injecter un signal de 315Hz par les bornes d'entrée de ligne puis faire varier le niveau d'entree	Confirmer	TP (DOL.L) TP (DOL.R)	Lorsque le niveau d'entrée est augmenté, la position "0dB" du décibelmètre doit s'allumer lorsque le niveau à la sortie TP est de –7,7dBv ±2dB	

9. Réglage de durée de recouvrement du système dbx

	Mode	Signal d'entrée appliqué et bande d'etalonnage	Emplacement du réglage	Emplacement de la borne d'étalonnage	Valeur relevée	Observations
	ARRÊT	Aucun signal	V901	Bornes R957	DC15mV	

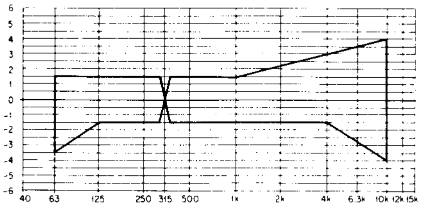
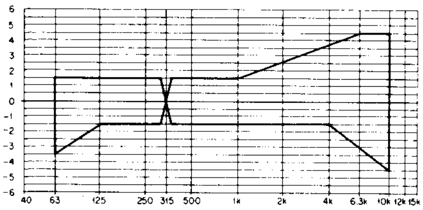
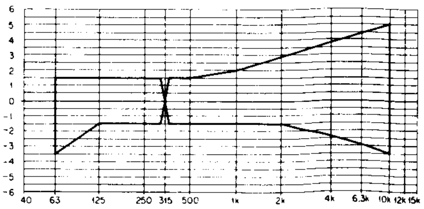
Bande d'étalonnage : STD-608A (NORM)	Bande d'étalonnage : STD-603 (CrO2)	Bande d'étalonnage : STD-610 (METAL)
Position du commutateur DOLBY NR sur OFF	Position du commutatateur DOLBY NR sur OFF	Position du commutateur DOLBY NR : sur OFF
		

Fig. 5-8 Réponse en fréquence du mode de duplication (aux fins de référence)

- DOL.L est le fil de jonction droit à C711 et DOL.R est le fil de jonction supérieur à C737.

	Emplacement du réglage			
	Platine magnétophone I		Platine magnétophone II	
Réglages	Canal gauche	Canal droit	Canal gauche	Canal droit
Egaliseur de lecture	V101	V201	V103	V203
Niveau de lecture	V102	V202	V104	V204
Oscillateur de polarisation	L301		L302	
Courant d'effacement	V301		V302	
Niveau d'enregistrement	V105	V205	V106	V206
Polarisation d'enregistrement	V107	V207	V108	V208
Détection de bande amorce	V303		V304	
Durée de recouvrement du système dbx	V901			

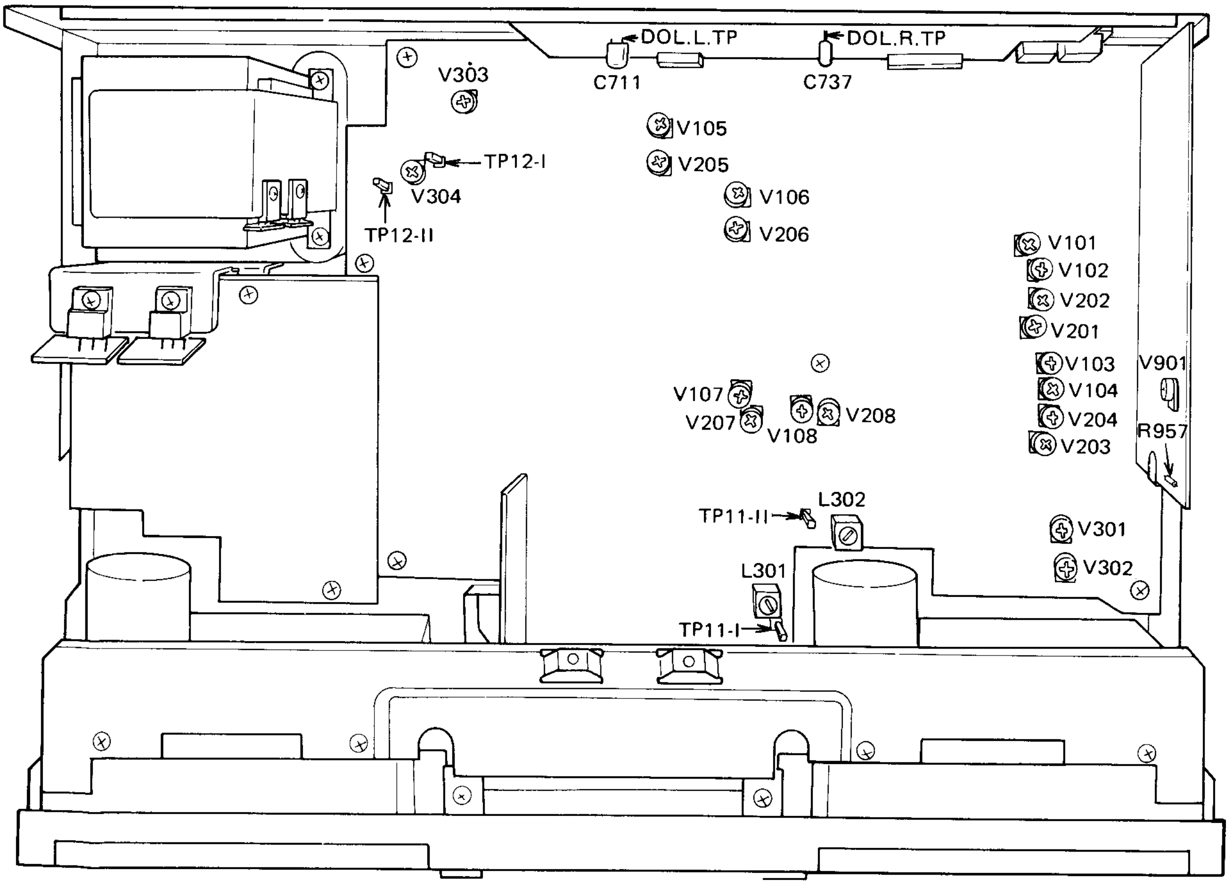

DOL.L.TP
DOL.R.TP
C711
C737
V303
V105
V205
TP12-I
V304
TP12-II
V106
V206
V101
V102
V202
V201
V103
V104
V204
V203
V901
R957
V107
V207
V108
V208
L302
TP11-II
L301
TP11-I
V301
V302

Fig. 5-9 Adjustment positions

5. AJUSTE

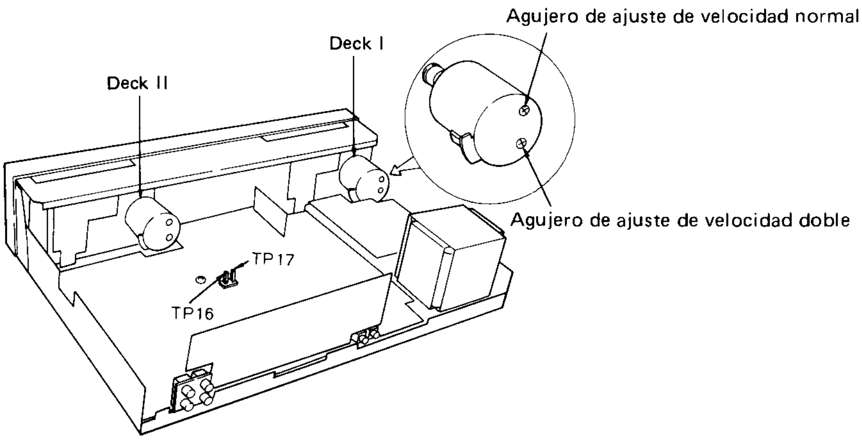
1. Inspección y ajuste de la velocidad de la cinta

• Deck I

Modo	Cinta de prueba	Posición de ajuste	Classificación (frecuencia de reproducción)
Reproducción "PLAY"	STD-301 (3kHz)	Cortocircuitar TP16 a TP17 desqués de un minuto de reproducción	
		Resistor variable VR (lado inferior)	6010Hz±10Hz (velocidad doble)
		Liberar el cortocircuito entre TP16 y TP17	
		Resistor variable VR (lado superior)	3010Hz±5Hz (velocidad normal)

• Deck II

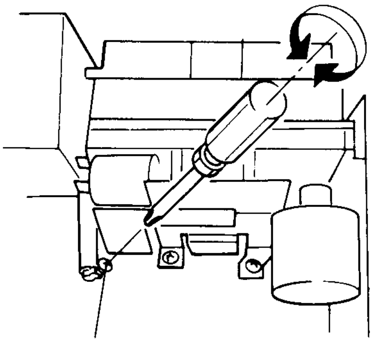
Modo	Cinta de prueba	Posición de ajuste	Classificatión (frecuencia de reproducción)
Reproducción "PLAY"	STD-301 (3kHz)	Cortocircuitar TP16 a TP17 después de un minuto de reproducción	
		Resistor variable VR (lado inferior)	±10Hz del ajuste del deck I
		Liberar el cortocircuito entre TP16 y TP17	
		Resistor variable VR (lado superior)	±5Hz del ajuste del deck I


Agujero de ajuste de velocidad normal
Deck I
Deck II
TP17
TP16
Agujero de ajuste de velocidad doble

2. Inspección y ajuste de amortiguación de las puertas

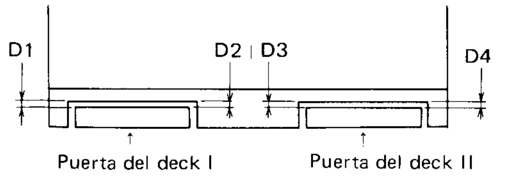
Posición de ajuste	Especificaciones
Tornillo de ajuste del cilindro Gire el tornillo de ajuste a la derecha si hay "rebotes" Gire el tornillo de ajuste a la izquierda si la puerta se abre en dos pasos	Al presionar los botones de expulsión "EJECT" para los decks I y II sin el cassette medio cargado, las respectivas puertas deben abrirse suavemente sin acción de "dos pasos" y sin rebotar en la posición completamente abierta.

<Referencia> Tiempo de abertura de puerta 0,8 seg. ±0,3 seg. (temperature normal)
Diferencia entre los decks I y II – menos de 16 mm (aprox.) cuando las puertas están completamente abiertas (a la temperatura normal)



3. Inspección y ajuste de la posición de las puertas

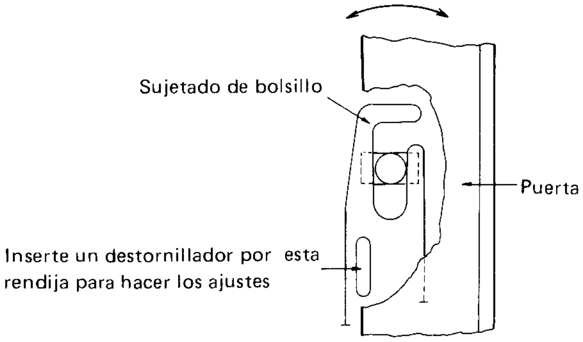
- Las dimensiones de la posición de las puertas vistas de arriba deben estar de acuerdo con las siguientes especificaciones.


D1
D2
D3
D4
Puerta del deck I
Puerta del deck II

<Dimensiones D>

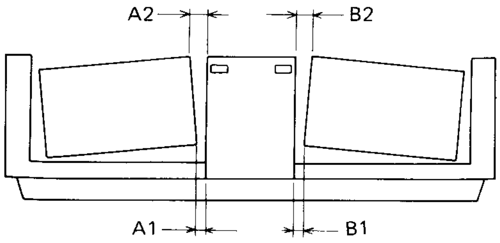
Valor estándar	1,2 mm
Valores permisibles	0,9 a 1,7 mm
Diferencia entre la derecha e izquierda	$\lvert D1 - D2 \rvert < 0,4$ mm $\lvert D3 - D4 \rvert < 0,4$ mm

- Si no están de acuerdo con los valores indicados, efectúe el ajuste doblando el sujetador de bolsillo como se muestra abajo.


Sujetado de bolsillo
Puerta
Inserte un destornillador por esta rendija para hacer los ajustes

4. Inspección de separación de las puertas

- Las dimensiones de la posición de las puertas vistas de la delantera deben estar de acuerdo con los siguientes valores especificados.



Separaciones
$0,8\ mm \leqq A1, A2, B1, B2 \leqq 1,7\ mm$

Inclinación
$\lvert A1 - A2 \rvert \leqq 0,5$ mm
$\lvert B1 - B2 \rvert \leqq 0,5$ mm

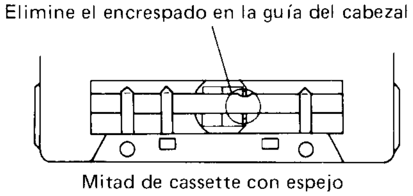
5. Ajuste de la dirección de marcha de la cinta

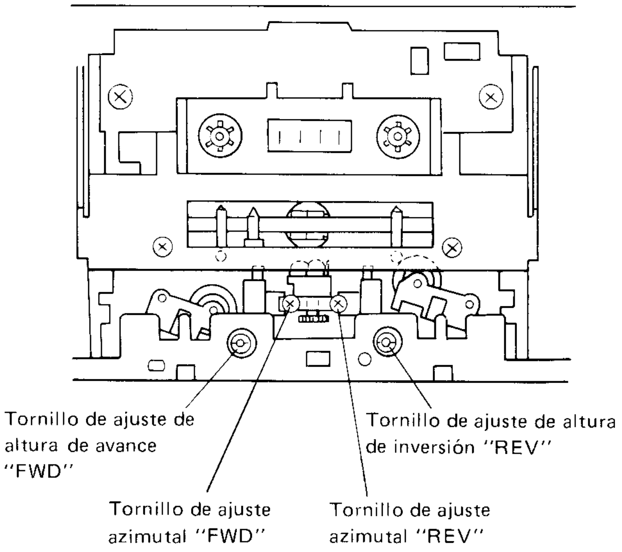
(quite las puertas de cassette y las unidades indicadoras de puerta)

Modo	Posición de ajuste	Especificaciones
Parada de avance "FWD STOP"	Tornillo de ajuste **azimultal de inversión** FWD	El cabezal debe estar en paralelo con la dirección de marcha de la cinta vista de arriba con el marco de puerta abierto.
Parada de inversión "REV STOP"	Tornillo de ajuste azimultal de inversión REV	

Coloque una mitad de cassette equipado con espejo, y levante la base del cabezal con la mano para poner la cinta en correcto contacto con la guía de cinta.

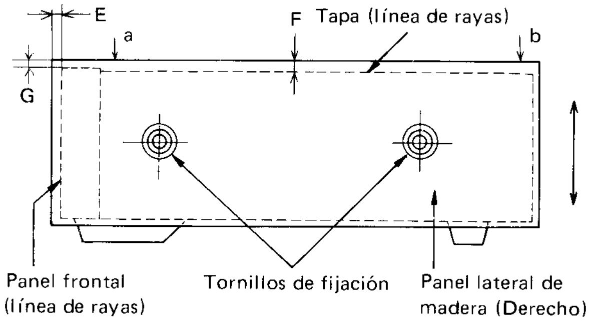
Parada "STOP"	Tornillos de ajuste de altura (derecho e izquierdo)	La cinta debe pasar por el centro de la guía de cinta (ajuste visual)
Avance-reproducción "FWD PLAY"	Tornillo de ajuste de altura izquierdo	Ajuste la guía de cinta de "corriente arriba" de manera que la cinta no se encrespe en la guía
Inversión-reproducción "REV PLAY"	Tornillo de ajuste de altura derecho	


Elimine el encrespado en la guía del cabezal
Mitad de cassette con espejo


Tornillo de ajuste de altura de avance "FWD"
Tornillo de ajuste de altura de inversión "REV"
Tornillo de ajuste azimutal "FWD"
Tornillo de ajuste azimutal "REV"

6. Inspección y ajuste de la posición de los paneles laterales de madera (sólo CT-S99WR/D/G)

- Las dimensiones de los paneles laterales de madera vistos de los costados deben estar de acuerdo con los valores dados abajo.


E
a
F
Tapa (línea de rayas)
b
G
Panel frontal (línea de rayas)
Tornillos de fijación
Panel lateral de madera (Derecho)

Dimensión E . . . . 1±0,5 mm
Inclinación (secciones c y d) . . . . $|Ec - Eb| < 0,5$ mm
Dimensión F . . . . 1,5±0,5 mm
Inclinación (secciones a y b) . . . . $|Fa - Fb| < 0,5$ mm
Dimensión G . . . . 0 – 2 mm

- Si no están de acuerdo con los valores especificados, afloje los dos tornillos de fijación y regule el panel hacia arriba/abajo/derecha/izquierda y reapriete los tornillos.

- El panel izquierdo se ajusta de la misma manera.

7. Inspección de la expulsión en el modo de reproducción

- Los decks no deben interrumpirse con el botón de expulsión "EJECT" oprimido durante el modo de reproducción.
- Los decks no deben interrumpirse cuando el aparato cae de una altura de 5 cm con el panel frontal y luego ambos costados hacia abajo.

5.2 AJUSTES ELECTRICOS

Requisitos previos para los ajustes eléctricos

1. Todos los ajustes mecánicos deben estar terminados.
2. Los cabezales deben estar limpios y desimanados.
3. Deje que el aparato se caliente por varios minutos antes de iniciar los ajustes.
4. Regule el nivel de señal a 0dBv=1Vrms.
5. Conecte una resistencia de carga de 50 kilo-ohmios (47 a 52 kilo-ohmios permisibles) a través de los terminales de salida.
6. Deje todos los interruptores DOLBY NR y dbx en OFF a menos que se indique de otra manera.

Cintas de prueba

Ajustes del sistema de reproducción	: STD-331B (Véase la Fig. 5-1)
Cinta en blanco NORMAL	: STD-608A
Cinta en blanco CrO_2	: STD-603
Cinta en blanco METAL	: STD-610

Lista de ajustes

- Sistema de reproducción del deck I

1. Ajuste azimutal del cabezal
2. Ajuste del ecualizador de reproducción
3. Inspección de conmutación del constante de tiempo
4. Ajuste del nivel de reproducción

- Sistema de reproducción del deck II

1. Ajuste azimutal del cabezal
2. Ajuste del ecualizador de reproducción
3. Inspección de conmutación del constante de tiempo
4. Ajuste del nivel de reproducción

- Sistema de grabación

1. Ajuste del oscilador de polarización
2. Ajuste de la corriente de borrado
3. Ajuste de respuesta de frecuencia de grabación/reproducción
4. Ajuste del nivel de grabación
5. Inspección de respuesta de frecuencia en el modo de copia
6. Inspección de respuesta de frecuencia en el modo de grabación
7. Ajuste de operación de detección del extremo de la cinta
8. Inspección del indicador de nivel 0dB
9. Ajuste del tiempo de recuperación del sistema dbx

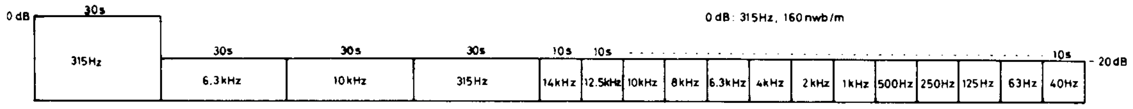

0 dB
30s
315Hz
0 dB: 315Hz, 160 nwb/m
30s
6.3kHz
30s
10kHz
30s
315Hz
10s
14kHz
10s
12.5kHz
10kHz
8kHz
6.3kHz
4kHz
2kHz
1kHz
500Hz
250Hz
125Hz
63Hz
10s
40Hz
- 20dB

Fig. 5-1 Cinta de prueba STD-331B

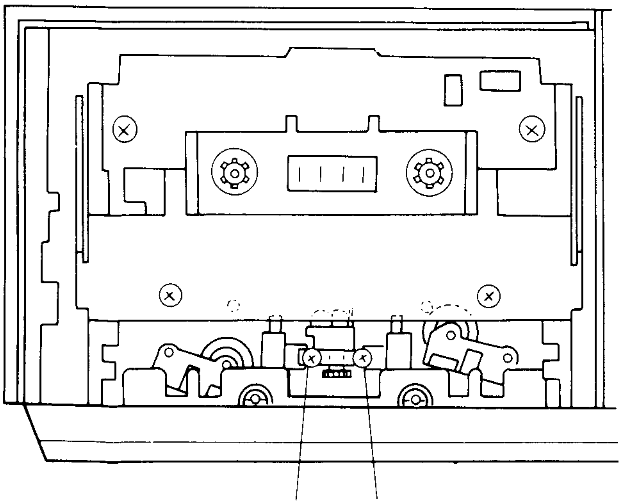

Tornillo de ajuste azimutal de inversión "REV"
Tornillo de ajuste azimutal de avance "FWD"

Fig. 5-2 Ajuste azimutal del cabezal

Cinta de prueba	STD-331B
Interruptor DOLBY NR	OFF

- El canal derecho es compensado por –0,5 dB a 125Hz y por –1dB a 63Hz mediante el efecto del borde.

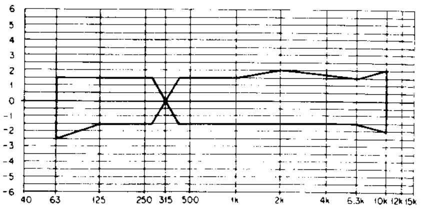


Fig. 5-3 Zona permisible de respuesta de frecuencia de reproducción

Sistema de reproducción del deck I

1. Ajuste azimutal del cabezal

- Regule V102 y V202 a las posiciones máximas, y V101 y V201 a las posiciones centrales mecánicas.

	Modo	Señal de entrada y cinta de prueba	Posición de ajuste	Posición de medición	Valor de ajuste	Observaciones
1	Avance-reprodcción "FWD-PLAY"	Reproduzca la porción de 10kHz/ −20dB de la cinta de prueba STD-331B	Tornillo de ajuste azimutal de avance "FWD" (Fig. 5-2)	Terminales de salida de línea derecho e izquierdo	Nivel máximo de señal de reproducción	
2	Inversión-reproducción "REV-PLAY"		Tornillo de ajuste azimutal de inversión "REV" (Fig. 5-2)			

2. Ajuste del ecualizador de reproducción

	Modo	Señal de entrada y cinta de prueba	Posición de ajuste	Posición de medición	Valor de ajuste	Observaciones
1	Avance-reproducción "FWD-PLAY"	Reproduzca la porción de 315Hz y 6,3kHz/−20dB de la cinta de prueba STD-331B	V101 (Canal Izq.) V201 (Canal Der.)	Terminales de salida de línea derecho e izquierdo	Regule el nivel de 6,3kHz a 0dB con respecto al nivel de reproducción de 315Hz	Variación de ±0,5dB permisible
2	Avance/ inversión/ reproducción "FWD/REV/ PLAY"	Reproduzca varias frecuencias a −20dB en la cinta de prueba STD-331B	Revisar		Los resultados deben sercomo se muestran en la zona indicada en la Fig. 5-3	

3. Inspección de conmutación del constante de tiempo

- Ponga el deck en el modo de reproducción sin colocar la cinta, y ponga el detector de cinta CrO_2 (ubicado en la parte superior de la unidad de transporte de la cinta) en ON y OFF. Confirme que el nivel de ruido en los terminales de salida de línea cambia por esta conmutación.

4. Ajuste del nivel de reproducción

- Efectúe cuidadosamente este ajuste, ya que su resultado se usa en la graduación del nivel Dolby NR.

	Modo	Señal de entrada y cinta de prueba	Posición de ajuste	Posición de medición	Valor de ajuste	Observaciones
	Avance-reproducción "FWD-PLAY"	Reproduzca la porción 315Hz/0dB de la cinta de prueba STD-331B	V102 (Canal Izq.)	TP (DOL.L) (*)	−7,7dBv (412,1mV)	
			V202 (Canal Der.)	TP (DOL.R) (*)		

* DOL.L es el cable conductor derecho en C711, y DOL.R es el cable conductor superior en C737.

Sistema de reproducción del deck II

1. Ajuste azimutal del cabezal

- Regule V104 y V204 a las posiciones máximas, y V103 y V203 a las posiciones centrales mecánicas.

	Modo	Señal de entrada y cinta de prueba	Posición de ajuste	Posición de medición	Valor de ajuste	Observaciones
1	Avance-reproducción "FWD-PLAY"	Reproduzca la porción de 10kHz/ −20dB de la cinta de prueba STD-331B	Tornillo de ajuste azimutal de avance "FWD" (Fig. 5-2)	Terminales de salida de línea derecho e izquierdo	Nivel máximo de señal de producción	
2	Inversión-reproducción "REV-PLAY"		Tornillo de ajuste azimutal de inversión "REV" (Fig. 5-2)			

2. Ajuste del ecualizador de reproducción

	Modo	Señal de entrada y cinta de prueba	Posición de ajuste	Posición de medición	Valor de ajuste	Observaciones
1	Avance-reproducción "FWD-PLAY"	Reproduzca la porción de 315Hz y 6,3kHz/−20dB de la cinta de prueba STD-331B	V103 (Canal Izq.) V203 (Canal Der.)	Terminales de salida de línea derecho e izquierdo	Regule el nivel de 6,3kHz a 0dB con respecto al nivel de reproducción de 315Hz	Variación de ±0,5dB permisible
2	Avance/ inversión/ reproducción "FWD/REV/ PLAY"	Reproduzca varias frecuencias a −20dB en la cinta de prueba STD-331B	Revisar		Los resultados deben sercomo se muestran en la zona indicade en la Fig. 5-3	

3. Inspección de conmutación del constante de tiempo

- Ponga el deck en el modo de reproducción sin colocar la cinta, y ponga el detector de cinta CrO_2 (ubicado en la parte superior de la unidad de transporte de la cinta) en ON y OFF. confirme que el nivel de ruido en los terminales de salida de línea cambia por esta conmutación.

4. Ajuste del nivel de reproducción

- Efectúe cuidadosamente este ajuste, ya que su resultado se usa en la graduación del nivel Dolby NR.

	Modo	Señal de entrada y cinta de prueba	Posición de ajuste	Posición de medición	Valor de ajuste	Observaciones
	Avance-reproducción "FWD-PLAY"	Reproduzca la porción 315Hz/0dB de la cinta de prueba STD-331B	V104 (Canal Izq.)	TP (DOL.L) (*)	−7,7dBv (412,1mV)	
			V204 (Canal Der.)	TP (DOL.R) (*)		

* DOL.L es el cable conductor derecho en C711, y DOL.R es el cable conductor superior en C737

Sistema de grabación

1. Ajuste del oscilador de polarización

	Modo	Señal de entrada y cinta de prueba	Posición de ajuste		Posición de medición	Valor de ajuste	Observaciones
	Grabación "REC"	Coloque la cinta de prueba STD-610 sin señal de entrada	Deck I Deck II	L301 L302	TP11 (I-IE) TP11 (II-IE)	Salida máxima (voltaje máximo de CA)	Ajuste el oscilador de polarización con los decks simultáneamente regulados al modo de grabación

2. Ajuste de corriente de borrado

	Modo	Señal de entrada y cinta de prueba	Posición de ajuste		Posición de medición	Valor de ajuste	Observaciones
	Grabación "REC"	Coloque la cinta de prueba STD-610 sin señal de entrada	Deck I Deck II	V301 V302	TP11 (I-IE) TP11 (II-IE)	160mV AC	Ajuste el oscilador de polarización con los decks I y II independientemente regulados al modo de grabación

3. Ajuste de respuesta de frecuencia de grabación y reproducción

- Deje el interruptor DOLBY NR en OFF.

	Modo	Señal de entrada y cinta de prueba	Posición de ajuste		Posición de medición	Valor de ajuste	Observaciones
1	Grabación/ pausa "REC/PAUSE"	Aplique una señal de 315Hz/ –30dBv a los terminales de entrada de línea y coloque la cinta de prueba STD-608A.	Controles del nivel de grabación "REC LEVEL"		Terminales de salide de línea derecho e izquierdo	–27,7dBv (41,2mV)	
2	Avance Grabación → Reproducción "FWD REC PLAY"	Grabe y reproduzca las señales de 315Hz y 6,3kHz a un nivel de entrada de –30dBv.	Deck I Deck II	V107 (L) V207 (R) V108 (L) V208 (R)		Efectúe el ajuste mediante repetición de la grabación/reproducción hasta obtener un nivel de reproducción de 6,3kHz de +1,0dB con respecto a la señal de 315Hz.	Ajuste con los decks I y II independientemente regulados al modo de grabación. Son permisibles las variaciones de +0,5dB a +1,5dB.
3	Grabación → Reproducción "FWD-PLAY"	Con un nivel de entrada de señales de grabación y reproducción de +30dBv de 63Hz a 12kHz)	Revisar			Deben estar en conformidad con los valores especificados para avance "FWD" e inversión "REV", y DOLBY NR OFF y ON (Tipos B y C) (Véase la Fig. 5-5) (tanto para avance "FWD" e inversión "REV")	
4	Si no están de acuerdo con los valores especificados (incluyendo las siguientes inspecciones), reajuste el nivel de reproducción de 6,3kHz a uno entre –0,5dB y +2,5dB con respecto a la señal de 315Hz en el procedimiento 2.						
5	Repita la inspección del procedimiento 3 usando la cinta de prueba STD-603. Se obtendrán las condiciones mostradas en la Fig. 5-6.						
6	Repita la inspección del procedimiento 3 usando la cinta de prueba STD-610. Se obtendrán las condiciones mostradas en la Fig. 5-7.						
7	Al término del ajuste, revise la distorsión y haga una confirmación con relación a "polarización inferior".						

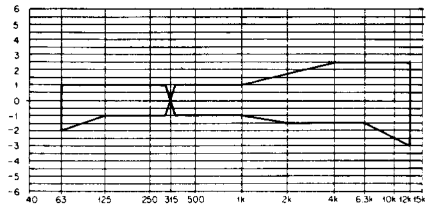
4. Ajuste del nivel de grabación

- Deje el interruptor DOLBY NR en OFF.

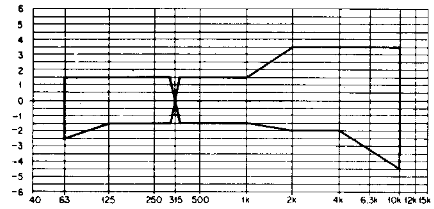
	Modo	Señal de entrada y cinta de prueba	Posición de ajuste		Posición de medición	Valor de ajuste	Observaciones
1	Grabación/ pausa "REC/PAUSE"	Aplique una señal de 315Hz/ –10dBv a los terminales de entrada de línea y coloque la cinta de prueba STD-608A	Controles del nivel de grabación "REC LEVEL"		TP (DOL.L) TP (DOL.R)	–7,7dBv (412,1mV)	
2	Grabación → Reproducción "REC - PLAY"	Grabe y reproduzca las señales de 315Hz/–10dBv a un nivel de entrada de –10dBv.	Deck I Deck II	V105 (L) V205 (R) V106 (L) V206 (R)		Efectúe el ajuste mediante repetición de la grabación/ reproducción hasta obtener un nivel de señal reproducción de 7,7dBv (412mV)	Ajuste con los decks I y II independientemente regulados al modo de grabación.
3	Grabación → Reproducción "REC - PLAY"	Grabe y reproduzca la señal de 315Hz/–10dBv en STD-603.	Revisar			–7,7±1,5dBv	
4	Grabación → Reproducción "REC - PLAY"	Grabe y reproduzca la señal de 315Hz/–10dBv en STD-610.	Revisar			–7,7±1,5dBv	

Cinta de prueba : STD-608A (NORM)

Interruptor DOLBY NR : OFF



Interruptor DOLBY NR : ON (Tipo B)



Interruptor DOLBY NR : ON (Tipo C)

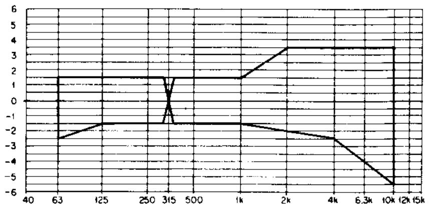
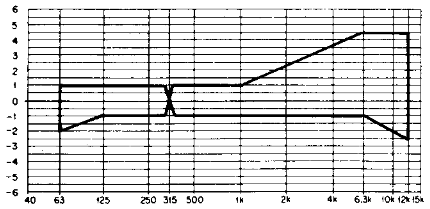


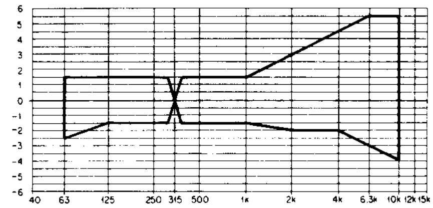
Fig. 5-5 Zonas permisibles de respuesta de frecuencia de grabación y reproducción (NORM)

Cinta de prueba : STD-603 (CrO2)

Interruptor DOLBY NR : OFF



Interruptor DOLBY NR : ON (Tipo B)



Interruptor DOLBY NR : ON (Tipo C)

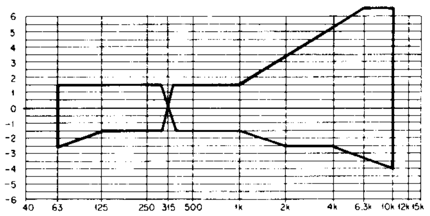
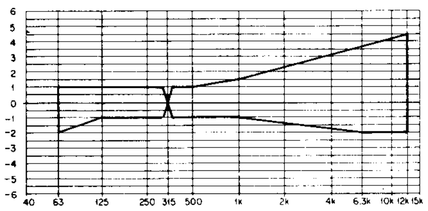


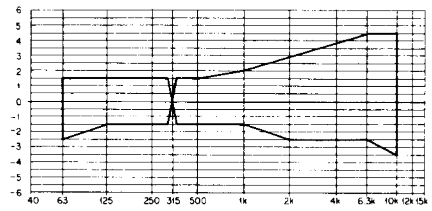
Fig. 5-6 Zonas permisibles de respuesta de frecuencia de grabación y reproducción (CrO2)

Cinta de prueba : STD-610 (METAL)

Interruptor DOLBY NR: OFF



Interruptor DOLBY NR : ON (Tipo B)



Interruptor DOLBY NR : ON (Tipo C)

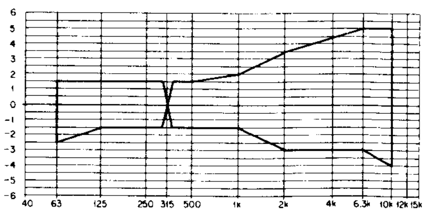


Fig. 5-7 Zonas permisibles de respuesta de frecuencia de grabación y reproducción (METAL)

5. Inspección de respuesta de frecuencia en el modo de copia

- Efectúe esta inspección después de terminar todos los ajustes.

	Modo	Señal de entrada y cinta de prueba	Posición de ajuste	Posición de medición	Valor de ajuste	Observaciones
1	Copia normal y copia a alta velocidad "COPY HIGH SPEED COPY"	Coloque la cinta de prueba STD-331B en el deck I, y la cinta de prueba STD-608 en el deck II.				Copie la señal de STD-331B en STD-608A (a velocidades dobles normales).
2	Reproduzca (deck II)	Reproduzca la señal grabada en la cinta STD-608A.	Revisar	Terminales de salida derecho e izquierdo	Deben estar de acuerdo con las especificaciones mostradas en la Fig. 5-8. (Especificaciones de referencia)	
3	Coloque la cinta de prueba STD-603 en el deck II, repita los procedimientos 1 y 2 y confirme que se obtienen las formas indicadas en la Fig. 5-8.					
4	Coloque la cinta de prueba STD-610 en el deck II, repita los procedimientos 1 y 2 y confirme que se obtienen las formas indicadas en la Fig. 5-8.					

6. Inspección de respuesta de frecuencia de GRABACION PARALELA "PARALLEL REC" en el modo de grabación simultánea.

- Deje el interruptor DOLBY NR en OFF.

	Modo	Señal de entrada y cinta de prueba	Posición de ajuste	Posición de medición	Valor de ajuste	Observaciones
1	Grabación/ Pausa "REC/PAUSE"	Aplique una señal de 315Hz/−30dBv a los terminales de entrada de línea y coloque la cinta de prueba STD-608A.	Controles del nivel de grabación "REC LEVEL"	Terminales de salida de línea derecho e izquierdo	−27,7dBv (41,2mV)	
2	Grabación y reproducción simultáneas	Con un nivel de entrada de −30dBv, grabe y reproduzca las señales de 63Hz a 12kHz.	Revisar		Deben estar de acuerdo con las especificaciones para avance "FWD" e inversión "REV", y DOLBY NR OFF y ON (Tipos B y C) (Véase la Fig. 5-5) (para avance "FWD" e inversión "REV").	
3	Repita la inspección del procedimiento 2 usando la cinta de prueba STD-603. Se obtendrán las condiciones mostradas en la Fig. 5-6.					
4	Repita la inspección del procedimiento 2 usando la cinta de prueba STD-610. Se obtendrán las condiciones mostradas en la Fig. 5-7.					

7. Ajuste de la operación de detección de la punta de la cinta

	Modo	Señal de entrada y cinta de prueba	Posición de ajuste	Posición de medición	Valor de ajuste	Observaciones
1	Reproducción "PLAY"	Sin entrada, coloque una mitad de cassette vacío.	Deck I V303 Deck II V304	TP12-I TP12-II	$1V^{+0,2}_{-0}$ V	
2	• Confirme que la punta de la cinta es correctamente detectda (en sentido de avance "FWD" e inversión "REV" cuando está en el modo de inversión sin fin).					

8. Inspección del indicador del nivel 0dB

	Modo	Señal de entrada y cinta de prueba	Posición de ajuste	Posición de medición	Valor de ajuste	Observaciones
	Grabación/ Pausa "REC/PAUSE"	Aplique una señal de 315Hz a los terminales de entrada de línea y luego varíe el nivel de entrada.	Revisar	TP (DOL.L) TP (DOL.R)	Al aumentar el nivel de entrada, la posición "0dB" del indicador de nivel queda concordada cuando la salida TP está a −7,7dBv±2dB.	

9. Ajuste del tiempo de recuperaciín del sistema dbx

	Modo	Señal de entrada y cinta de prueba	Posición de ajuste	Posición de medición	Valor de ajuste	Observaciones
	Parada "STOP"	Ninguna	V901	Terminales R957	DC15mV	

Cinta de prueba : STD-608A (NORM)	Cinta de prueba : STD-603 (CrO2)	Cinta de prueba : STD-610 (METAL)
Interruptor DOLBY NR : OFF	Interruptor DOLBY NR : OFF	Interruptor DOLBY NR : OFF

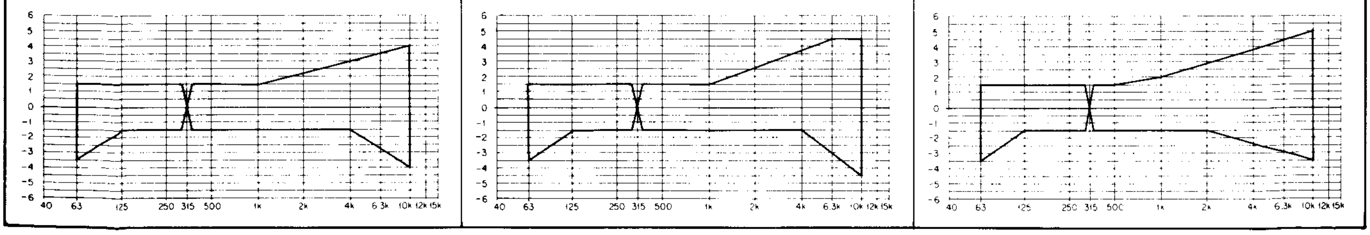
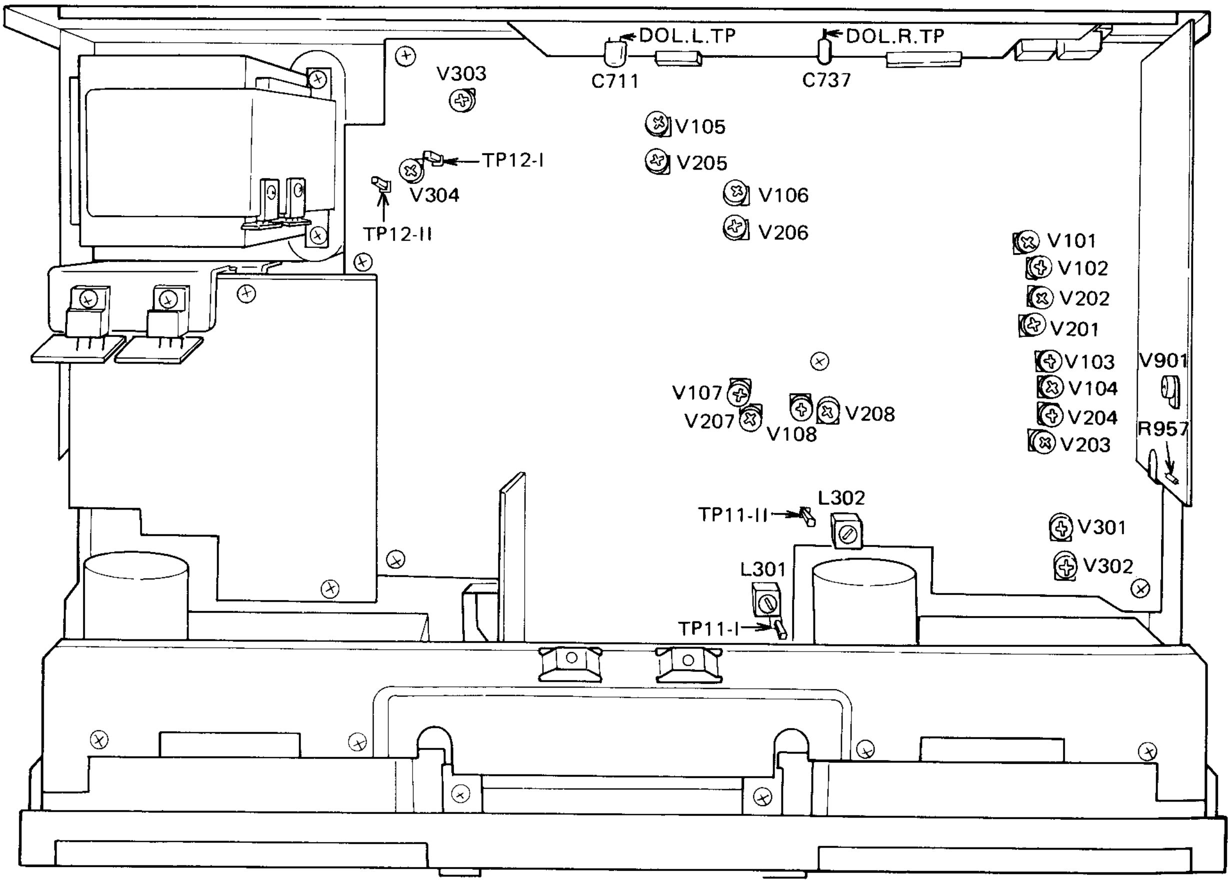


Fig. 5-8 Respuesta de frecuencia en el modo de copia (especificaciones de referencia)

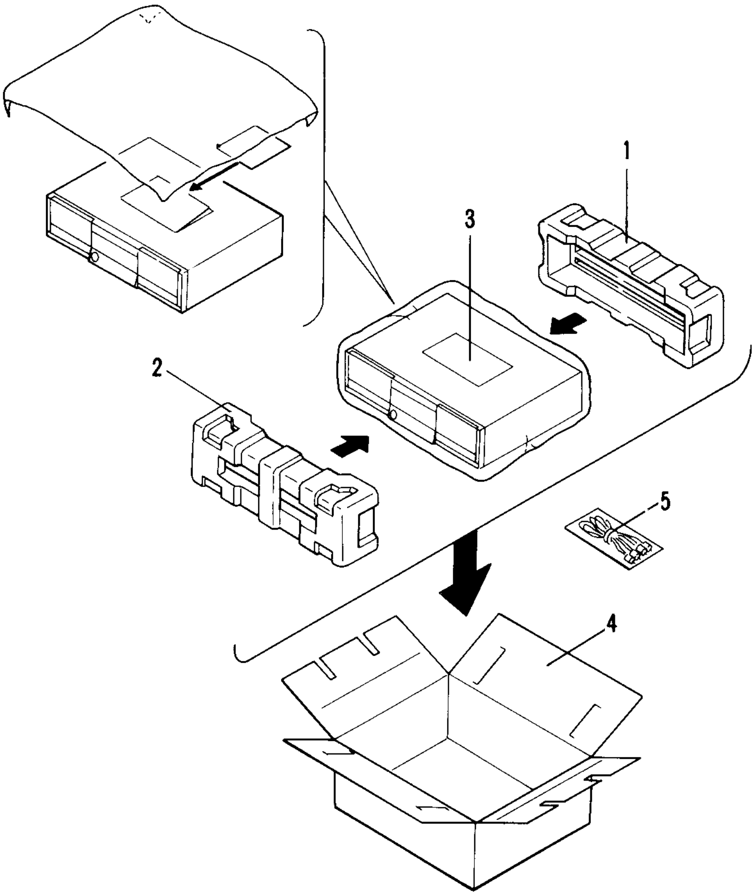
Ajustes	Posición de ajuste			
	Deck I		Deck II	
	Canal Izq.	Canal Der.	Canal Izq.	Canal Der.
Ecualizador de reproducción	V101	V201	V103	V203
Nivel de reproducción	V102	V202	V104	V204
Oscilador de polarización	L301		L302	
Corriente de borrado	V301		V302	
Nivel de reproducción	V105	V205	V106	V206
Polarización de grabación	V107	V207	V108	V208
Detección de la punta de la cinta	V303		V304	
Tiempo de recuperación del sistema dbx	V901			

- DOL.L es el cable conductor derecho en C711, y DOL.R es el cable conductor superior en C737.


DOL.L.TP
DOL.R.TP
C711
C737
V303
TP12-I
V304
TP12-II
V105
V205
V106
V206
V101
V102
V202
V201
V103
V104
V204
V203
V901
R957
V107
V207
V108
V208
TP11-II
L302
L301
TP11-I
V301
V302

6. PACKING

Mark	No.	Part No.	Description
	1	RHA-273	Pad R (without D/G type)
		RHA-272	Pad R (for D/G type)
	2	RHA-271	Pad F (without D/G type)
		RHA-270	Pad F (for D/G type)
	3	RRB-257	Operating instructions (English) (CT-S99WR/KU, HB, D)
		RRB-267	Operating instruction (English) (CT-S99WR/D/G)
		RRB-258	Operating instuctions (English) (CT-V70/KU)
	4	RHG-796	Packing case (CT-S99W[BK]/KU, HB, D, HEM)
		RHG-797	Packing case (CT-S99WR/HEM)
		RHG-859	Packing case (CT-S99WR[BK]/D/G)
		RHG-799	Packing case (CT-V70/KU)
	5	RDE-010	Connection cord (all models)
		RED-081	Connection cord for control (CT-V70 [BK], CT-S99WR [BK]/D/G only)



7. ELECTRICAL PARTS LIST

NOTES:

- *When ordering resistors, first convert resistance values into code form as shown in the following examples.*

  Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).

  560Ω 56×10^1 561 .... RD¼PS $\boxed{5}\boxed{6}\boxed{1}$ J
  47kΩ 47×10^3 473 .... RD¼PS $\boxed{4}\boxed{7}\boxed{3}$ J
  0.5Ω 0R5 .... RN2H $\boxed{0}\boxed{R}\boxed{5}$ K
  1Ω 010 .... RS1P $\boxed{0}\boxed{1}\boxed{0}$ K

  Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).

  5.62kΩ 562×10^1 5621.......... RN¼SR $\boxed{5}\boxed{6}\boxed{2}\boxed{1}$ F
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*

  ★★ GENERALLY MOVES FASTER THAN ★.
  This classification shall be adjusted by each distributor because it depends on model number , temperature, humidity, etc.

Miscellaneous

P.C. BOARD UNITS

Mark	Symbol & Description	Part No.
	Main unit	Non supply
	Headphone jack unit	
	Dolby NR unit	
	Power supply unit	
	Display unit	
	Operation swtich unit	
	Motor drive unit (I)	
	Motor drive unit (II)	
	Power switch unit	
	Door indicator unit (I)	
	Door indicator unit (II)	
	Transistor unit (A)	
	Transistor unit (B)	
	Transistor unit (C)	
	Transistor unit (D)	
	dbx unit	

FUSES

Mark	Symbol & Description		Part No.
⚠★★	FU801, FU802	Fuse (800mA)	REK-079
⚠★★	FU803	Fuse (1.6A)	REK-074

OTHERS

Mark	Symbol & Description	Part No.
⚠ ★	T1 Power transformer (120V)	RTT-411
⚠	AC power cord	RDG-048
⚠	Strain relief (for AC power cord)	REC-395
	Level meter assembly	RAW-213

TAPE TRANSPORT UNIT (DECK I)

Mark	Symbol & Description		Part No.
★★	Tape head assembly (HD425RVJ)		RPB-120
★★	D1901/Q1901	Sensor assembly	RXC-049
★★	D1902/Q1902	Photo interrupter	NJL5141E
★★	RM	Reel motor assembly	RXM-122
★★	AM	Assist Motor assembly	RXM-134
★★	CM	Capstan motor assembly	RXM-124
★★	S1901	Tact switch (B-REC INH)	RSG-162
★★	S1902	Tact switch (DOOR)	RSG-162
★★	S1903	Tact swtich (A-REC INH)	RSG-162
★★	S1904	Tact switch (METAL DET.)	RSG-162
★★	S1905	Tact switch (CrO2 DET.)	RSG-162

TAPE TRANSPORT UNIT (DECK II)

Mark	Symbol & Description		Part No.
★★	Tape head assembly (HD425RVJ)		RPB-120
★★	D2001/Q2001	Sensor assembly	RXC-049
★★	D2002/Q2002	Photo interrupter	NJL5141E
★★	RM	Reel motor assembly	RXM-122
★★	AM	Assist motor assembly	RXM-123
★★	CM	Capstan motor assembly	RXM-124
★★	S2001	Tact switch (B-REC INH)	RSG-162
★★	S2002	Tact switch (DOOR)	RSG-162
★★	S2003	Tact switch (A-REC INH)	RSG-162
★★	S2004	Tact switch (METAL DET.)	RSG-162
★★	S2005	Tact switch (CrO2 DET.)	RSG-162

Main Unit

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	Q357	PD3031A
★★	Q355, Q356	LC7800
★★	Q103, Q109	M5220L
★★	Q107, Q113, Q116, Q120	M5218L
★★	Q119	M5218P
★★	Q332, Q333, Q336, Q337	BU4066B (TC4066BP)
★★	Q358, Q363	M5233P (NJM2903D)
★★	Q117, Q118, Q218, Q352	IR2C30
★★	Q331	BA335
★★	Q112, Q115, Q121, Q212, Q215, Q221	2SD1302
★★	Q101, Q108, Q201, Q208, Q302, Q305, Q309, Q318 – Q320, Q345 – Q347, Q359 – Q362	2SC1740S
⚠ ★★	Q313, Q317	2SD1276
★★	Q310 – Q312, Q314 – Q316	2SC2060-Q
★★	Q348 – Q351	2SC3246
★★	Q301, Q304, Q340	DTC114EK
★★	Q338	DTA124K
★★	Q102, Q104 – Q106, Q110, Q111, Q114, Q202, Q204 – Q206, Q210, Q211, Q214, Q303, Q307, Q308, Q329, Q330, Q334, Q335, Q339, Q341, Q342, Q353, Q354	2SC2412K
★★	Q306, Q321 – Q328, Q343, Q344	2SA1037K
★	D307 – Q310	DAN202K
★	D301 – D306, D311 – D318, D322	1S2473
★	D319 – D321 (CT-V70 [BK], CT-S99WR [BK]/D/G only)	1S2473

SWITCHES

Mark	Symbol & Description	Part No.
★★	RL301, RL302 Reed relay	RSR-035

COILS

Mark	Symbol & Description	Part No.
	L303, L305 Line coil	RTF-101
	L306 Peaking coil (390μH)	RTF-111
	L101, L104, L201, L204 Trap coil	RTF-157
	L103, L106, L203, L206 Peaking coil (5.6mH)	RTF-125
	L102, L105, L202, L205 Peaking coil (8.2mH)	RTF-127
	L304 OSC coil	RTD-035
	L301, L302 Step up coil	RTD-036

CAPACITORS

Mark	Symbol & Description	Part No.
	C141, C241, C341	CEAR10M50
	C118, C125, C218, C225, C343	CEAR47M50
	C137, C138, C237, C238, C352, C356, C361	CEA010M50
	C120, C127, C220, C227, C335, C336, C338, C359	CEA4R7M50
	C101, C107, C110, C112, C116, C135, C140, C203, C207, C210, C216, C235, C240, C301, C321	CEA100M16
	C311, C312, C319, C320	CEA330M16
	C136, C236, C322, C323, C326, C327	CEA470M10
	C105, C114, C205, C214, C302 – C304, C345	CEA101M10
	C339, C358	CEA221M6R3
	C349	CEA471M6R3
	C331, C333	CQMA332J50
	C129, C229	CQMA392J50
	C134, C234	CQMA482J50
	C131, C231	CQMA562J50
	C119, C123, C126, C128, C130, C132, C219, C226, C228, C230, C232	CQMA682J50
	C106, C115, C121, C124, C133, C206, C215, C221, C224, C233, C309, C310, C317, C318, C332	CQMA103J50
	C122, C222	CQMA123J50
	C109, C209	CQMA223J50
	C108, C208	CQMA393J50
	C117, C217	CQMA273J50
	C342	CQMA104J50
	C306, C307, C314, C315	CCDSL221K500
	C104, C113, C204, C213	CCPSL101J50
	C330	CQPA562J100
	C308, C316	CQPA272J630
	C346, C347	CCDCH300J50
	C139, C239	CCDSL101J50
	C101, C201	CKPYB221K50
	C102, C202	CKPYB471K50
	C111, C211	CKPYB681K50
	C355, C357, C360, C362	CKDYF103Z50
	C305, C337, C340	CKDYF473Z50
	C324, C325, C328, C329, C363, C364	CKSYF104Z50
	C348	CCSSL102J50

RESISTORS

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Symbol & Description	Part No.
★	V101 – V106, V201 – V206 Semi-fixed (22k-B)	VRTB6VS223
★	V301 – V304 Semi-fixed (10k-B)	VRTB6VS103
★	V107, V108, V207, V208 Semi-fixed (100k-B)	VRTB6VS104
	R440 Resistor array 10kx4	RM4-103J
	R441 Resistor array 10kx6	RM6-103J
⚠	R330	RD1/4PM6R8J
	R117, R138, R146, R152, R173, R203, R232, R238, R252, R273, R304, R310, R351, R352, R354, R358, R373, R381, R382, R384, R423, R424, R426, R427, R432 – R435, R445, R449, R454, R455	RD1/4PM □□□J
⚠	R317, R318, R320	RD1/6PM □□□ J
	R102, R104 – R116, R118 – R120, R122 – R136, R140 – R145, R147 – R150, R153, R155, R157 – R159, R164, R168, R170 – R172, R202, R204 – R216, R218 – R220, R222 – R231, R233 – R235, R240, R242, R243, R245 – R251, R253, R255, R257 – R259, R264, R268, R269, R270 – R272, R301, R305, R307, R308, R311 – R313, R315, R316, R323, R325 – R328, R336 – R340, R344, R349, R355 – R357, R360, R361, R364 – R380, R383, R385, R424, R436 – R439, R443, R444, R446, R447, R451, R456 – R458, R460, R461, R464, R467, R470, R473, R474, R476 – R478, R482, R484, R486, R488, R490	RD1/6PM □□□J
	Other resistors	RS1/8S □□□J

OTHERS

Mark	Symbol & Description	Part No.
	Terminal (LINE)	RKB-020
	Phone jack (REMOTE) (CT-V70 [BK], CT-S99WR [BK]/D/G only)	RKN-071
★	Ceramic resonator	RSS-035
	Connector 5-P	RKP-587
	Connector 8-P	RKP-590

Headphone Jack Unit

RESISTORS

Mark	Symbol & Description	Part No.
	R501, R601	RD1/6PM470J
	R502, R602	RS1/8S561J

OTHERS

Mark	Symbol & Description	Part No.
	Phone jack (PHONES)	RKN-096

Dolby NR Unit

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	Q707, Q708	HA12058NT
★★	Q702	M5218L
★★	Q701, Q703 – Q705	2SC2412K
★★	Q706	DTC114EK

COILS

Mark	Symbol & Description	Part No.
	L709, L710 Coil (36mH)	RTF-155
	L703, L706 Trap coil	RTF-156
	L705, L708 Trap coil	RTF-163
	L701, L702 MPX filter	RTF-165

CAPACITORS

Mark	Symbol & Description	Part No.
	C715, C726, C742, C752	CEAR15M50
	C716, C743	CEAR33M50
	C718, C727, C741, C753	CEAR47M50
	C717, C744	CEAR68M50
	C729, C755	CEA2R2M50
	C712, C723, C738, C749	CEA4R7M50
	C701 – C704, C707 – C709, C719, C735, C745	CEA100M16
	C730	CEA330M16
	C731, C733	CEA101M10
	C713, C739	CEA221M10
	C728, C754	CQMA182J50
	C705, C706	CQMA332J50
	C722, C748	CQMA472J50
	C721, C747	CQMA562J50
	C724,C750	CQMA822J50
	C710, C736	CQMA103J50
	C714, C740	CQMA183J50
	C711, C737	CQMA333J50
	C725, C751	CQMA823J50
	C720, C746	CCDSL390J50
	C732, C734	CKDYF473Z50

RESISTORS

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Symbol & Description	Part No.
	R718	RD1/4PM103J
	R701, R706, R721, R723 – R725, R727, R729, R732, R733, R735, R740, R743 – R745	RD1/6PM □□□J
	Other resistors	RD1/8S □□□J

OTHERS

Mark	Symbol & Description	Part No.
	J08 Connector socket 5-P	RKP-599
	J07 Connector socket 8-P	RKP-602

Power Supply Unit

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
⚠ ★★	Q805	2SD1276
★★	Q802, Q807 – Q809	2SC1740S
★★	Q804, Q806	2SA933S
⚠ ★	D801, D805	1B2Z1-LC2
⚠ ★	D802, D806	1B2C1-LC2
⚠ ★	D815	1SR35-100A
★	D804, D809 – D813	1S2473
⚠ ★	D803	RD3.6EB1 (RD3.6EB2) (MTZ3.6A) (MTZ3.6B)
⚠ ★	D807	RD6.2EB2 (RD6.2EB3) (MTZ6.2B) (MTZ6.2C)
⚠ ★	D808	RD9.1EB2 (MTZ9.1B)
⚠ ★	D814	RD12EB2 (MTZ12B)

CAPACITORS

Mark	Symbol & Description	Part No.
	C819	CEA2R2M50
	C822	CEA4R7M50
	C821	CEA100M16
	C813	CEA220M25
	C804	CEA470M10
	C826	CEA101M16
	C816	CEA101M25
	C805, C810	CEA221M10
	C802, C808, C824	CEA221M16
	C823	CEA221M25
	C818	CEA102M10
	C801, C807	CEA102M25
	C812 Electrolytic (4700/25V)	RCH-054
	C815 Electrolytic (6800/6.3V)	RCH-071 (RCH-072)
	C814, C817, C820, C825	CKDYF103Z50
	C806, C811	CKDYF473Z50

RESISTORS

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Symbol & Description	Part No.
⚠	R812, R825	RD1/2PMF □□□J
	R801 – R811, R813	RD1/4PM □□□J
	Other resistors	RD1/6PM □□□J

Display Unit

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★	D1307 – D1312, D1315	1S2473
★	D1313, D1314	AA3423S
★	D1303 – D1305	BR3423S
★	D1316	SEL4214S
★	D1302	AA5524S-1C5
★	D1301	BR5524S
★	D1306	EAA3423S

SWITCHES

Mark	Symbol & Description	Part No.
★★	S1301 – S1303, S1310 – S1313 Tact switch	RSG-163
★★	S1305 Slide switch	RSH-073
★★	S1304 Slide switch	RSH-074
★★	S1306 – S1309 Push switch assembly	RSG-165

RESISTORS

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Symbol & Description	Part No.
★	V1301 Variable (REC LEVEL)	RCW-011
	R1302 – R1304	RD1/4PM181J
	R1301	RD1/6PM562J

Operation Switch Unit

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★	D1201, D1202	AA3423S

SWITHCES

Mark	Symbol & Description	Part No.
★★	S1201 – S1212 Tact switch	RSG-163

RESISTOR

Mark	Symbol & Description	Part No.
	R1201	RS1/8S470J

Motor Drive Unit (I)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	Q1401, Q1402	BA6109
★★	Q1403	DTC124K
⚠ ★	D1401	RD5.6EB3 (MTZ5.6C)

CAPACITORS

Mark	Symbol & Description	Part No.
	C1401, C1403	CKSYF103Z50
	C1402, C1404	CKSYF104Z50

RESISTORS

Note: *When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.*

Mark	Symbol & Description	Part No.
	All resistors	RS1/8S □□□J

Motor Drive Unit (II)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	Q1501, Q1502	BA6109
★★	Q1503	DTC124K
★	D1501	RD5.6EB3 (MTZ5.6C)

CAPACITORS

Mark	Symbol & Description	Part No.
	C1501, C1503	CKSYF103Z50
	C1502, C1504	CKSYF104Z50

RESISTORS

Note: *When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before*

Mark	Symbol & Description	Part No.
	All resistors	RS1/8S □□□J

Door Indicator Unit (I)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★	D1004	MU03-2250
★	D1001 – D1003	MU03-3201

RESISTORS

Note: *When ordering resistors, convert the resistance value into code form, and then rewrite part no. as before.*

Mark	Symbol & Description	Part No.
	R1002, R1005, R1008, R1010	RD1/6PM □□□J
	R1001, R1003, R1004, R1006, R1007, R1009	RS1/8S100J

Door Indicator Unit (II)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★	D1101	MU03-2250
★	D1102 – D1104	MU03-3201

RESISTORS

Note: *When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.*

Mark	Symbol & Description	Part No.
	R1101, R1103, R1106, R1109	RD1/6PM □□□J
	R1102, R1104, R1105, R1107, R1108, R1110	RS1/8S100J

Power Switch Unit

SWITCH

Mark	Symbol & Description	Part No.
⚠ ★★	S1601 Push switch (POWER)	RSA-063

CAPACITOR

Mark	Symbol & Description	Part No.
⚠	C1601 Ceramic (0.01/AC250V)	RCG-008

Transistor Unit (A)

SEMICONDUCTOR

Mark	Symbol & Description	Part No.
⚠ ★★	Q1701	2SD1276

Transistor Unit (B)

SEMICONDUCTOR

Mark	Symbol & Description	Part No.
⚠ ★★	Q1801	2SD1276

Transistor Unit (C)

SEMICONDUCTOR

Mark	Symbol & Description	Part No.
⚠ ★★	Q2201	2SD1276

Transistor Unit (D)

SEMICONDUCTOR

Mark	Symbol & Description	Part No.
⚠ ★★	Q2301	2SB950

dbx Unit

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	Q913	AN6291
★★	Q914	M5218L
⚠ ★★	Q901 – Q912, Q915, Q919	2SC1740SLN
⚠ ★★	Q916 – Q918	2SA933S
★	D903	RD5.6EB (MTZ5.6A/B)
★	D901, D902	1S2473

CAPACITORS

Mark	Symbol & Description	Part No.
	C946	CEA101M16
	C947	CEA331M10
	C939, C940, C945	CEA330M16
	C925, C926, C948	CEA470M10
	C929, C930, C936, C943, C944	CEA100M16
	C949	CEA4R7M50
	C935, C937, C938	CEA010M50
	C917, C918 Electrolytic (10/16V)	RCH-069 (RCH-070)
	C919, C920 Electrolytic (0.68/50V)	RCH-073 (RCH-074)
	C913, C914	CEAR33M50
	C901, C902	CEAR22M50
	C941, C942	CCDSL181J50
	C903 – C906	CQMA104J50
	C915, C916	CQMA333J50
	C923, C924, C933, C934	CQMA223J50
	C927, C928	CQMA472J50
	C907 – C910	CQMA332J50
	C921, C922	CQSA471J50
	C931, C932	CQSA391J50
	C911, C912	CQSA331J50

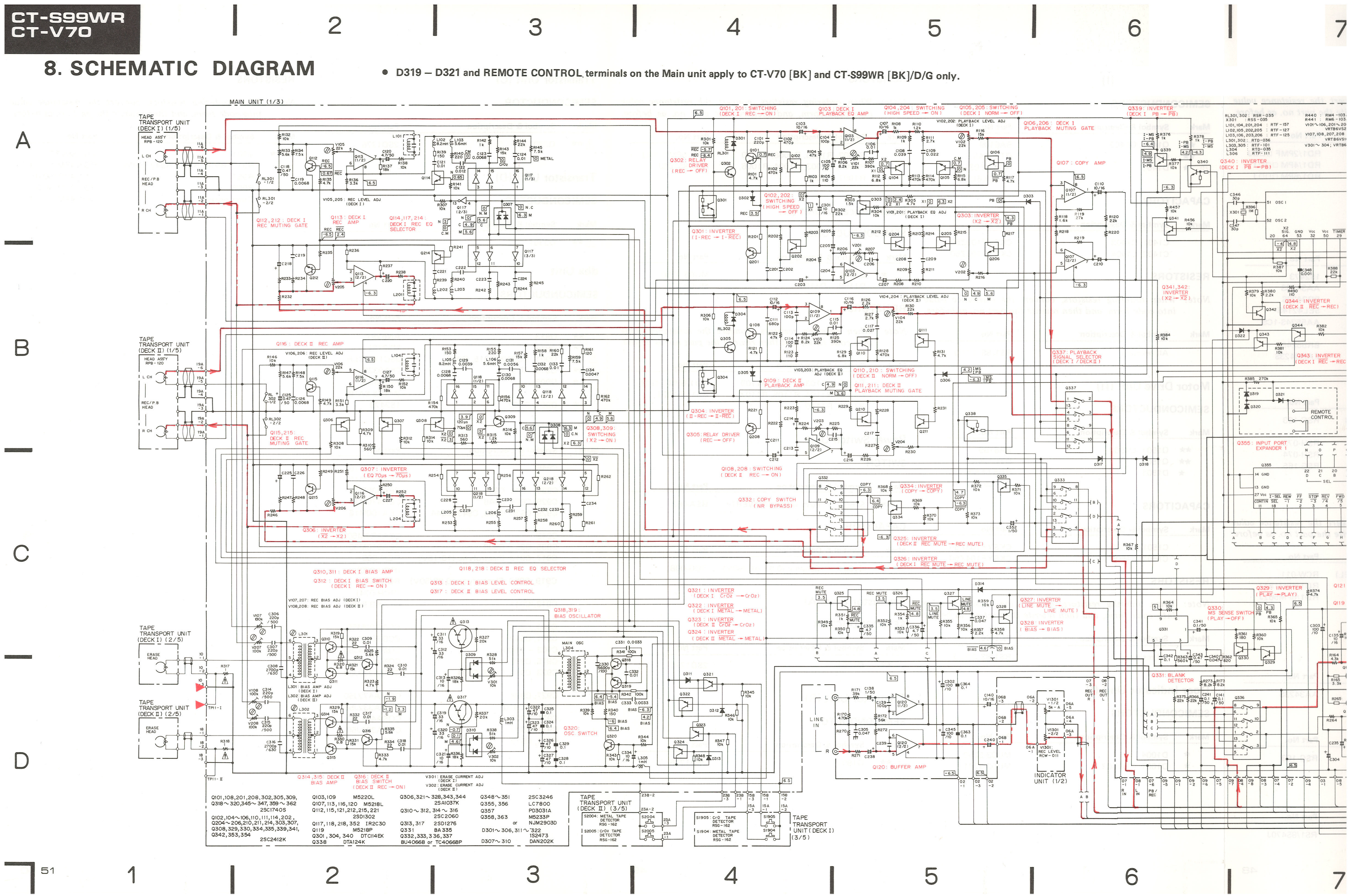
RESISTORS

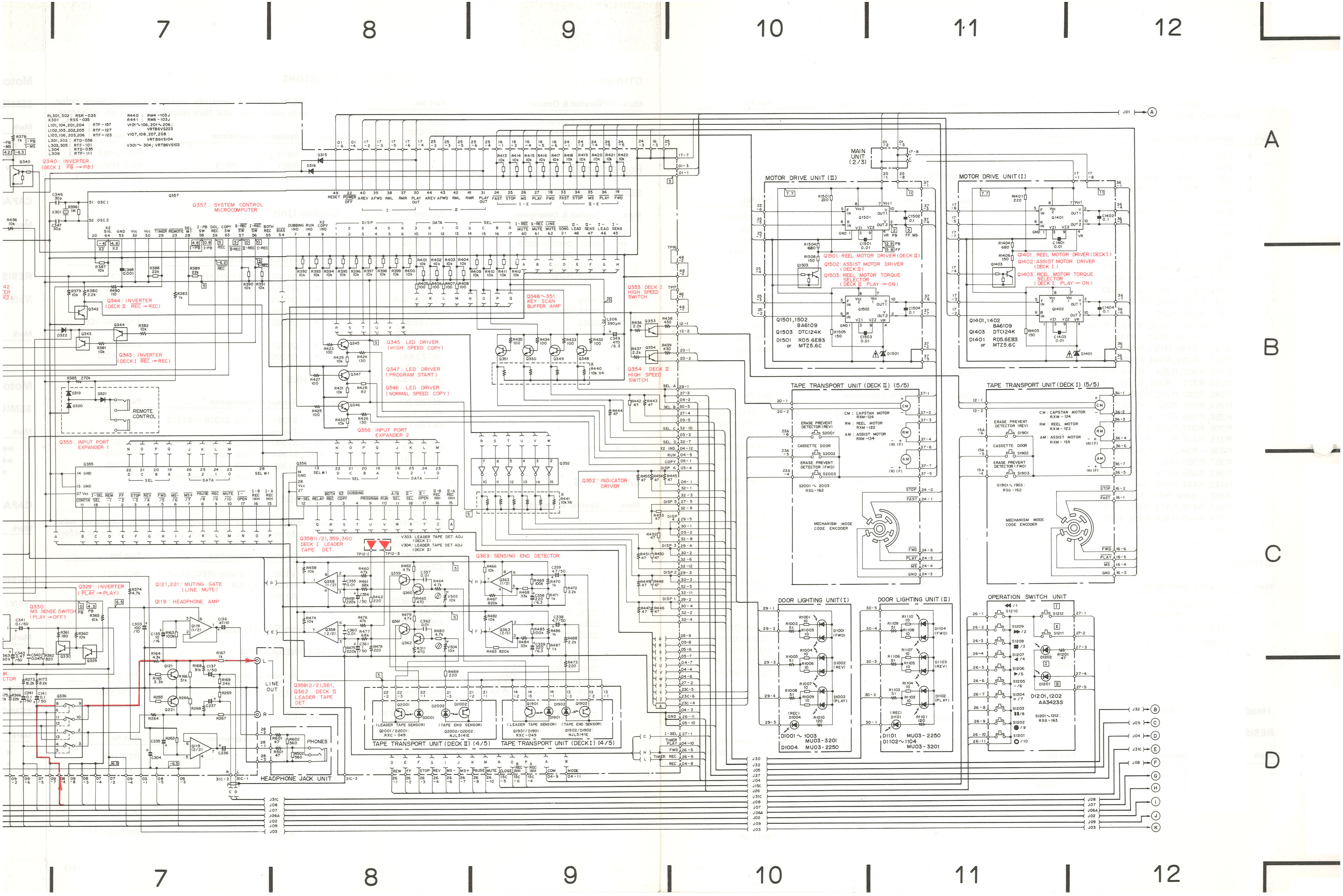
Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Symbol & Description	Part No.
★★	V901	VRTB6VS222
	R912, R914, R916, R942, R959	RD1/4PM □□□J
	R957	RN1/4PQ1001F
	R968	RD1/2PMF470J
	Other resistors	RD1/6PM □□□J

8. SCHEMATIC DIAGRAM

- D319 – D321 and REMOTE CONTROL terminals on the Main unit apply to CT-V70 [BK] and CT-S99WR [BK]/D/G only.


1
2
3
4
5
6
7
A
B
C
D
MAIN UNIT (1/3)
TAPE TRANSPORT UNIT (DECK I) (1/5)
HEAD ASS'Y RPB-120
L CH
REC/PB HEAD
R CH
TAPE TRANSPORT UNIT (DECK II) (1/5)
TAPE TRANSPORT UNIT (DECK I) (2/5)
ERASE HEAD
TAPE TRANSPORT UNIT (DECK II) (2/5)
Q101, 201 : SWITCHING (DECK I REC → ON)
Q103 : DECK I PLAYBACK EQ AMP
Q104, 204 : SWITCHING (HIGH SPEED → ON)
Q105, 205 : SWITCHING (DECK I NORM → OFF)
Q106, 206 : DECK I PLAYBACK MUTING GATE
Q107 : COPY AMP
Q112, 212 : DECK I REC MUTING GATE
Q113 : DECK I REC AMP
Q114, 117, 214 : DECK I REC EQ SELECTOR
V105, 205 : REC LEVEL ADJ (DECK I)
Q302 : RELAY DRIVER (REC → OFF)
Q102, 202 : SWITCHING (HIGH SPEED → OFF)
Q301 : INVERTER (I-REC → I-REC)
Q303 : INVERTER (X2 → X2)
V101, 201 : PLAYBACK EQ ADJ (DECK I)
V102, 202 : PLAYBACK LEVEL ADJ (DECK I)
Q116 : DECK II REC AMP
V106, 206 : REC LEVEL ADJ (DECK II)
Q115, 215 : DECK II REC MUTING GATE
Q307 : INVERTER (EQ 70μs → 70μs)
Q306 : INVERTER (X2 → X2)
Q308, 309 : SWITCHING (X2 → ON)
Q109 : DECK II PLAYBACK AMP
Q110, 210 : SWITCHING (DECK II NORM → OFF)
Q111, 211 : DECK II PLAYBACK MUTING GATE
V103, 203 : PLAYBACK EQ ADJ (DECK II)
V104, 204 : PLAYBACK LEVEL ADJ (DECK II)
Q304 : INVERTER (II-REC → II-REC)
Q305 : RELAY DRIVER (REC → OFF)
Q108, 208 : SWITCHING (DECK II REC → ON)
Q332 : COPY SWITCH (NR BYPASS)
Q334 : INVERTER (COPY → COPY)
Q325 : INVERTER (DECK II REC MUTE → REC MUTE)
Q326 : INVERTER (DECK I REC MUTE → REC MUTE)
Q337 : PLAYBACK SIGNAL SELECTOR (DECK I / DECK II)
Q339 : INVERTER (DECK I PB → PB)
Q340 : INVERTER (DECK I PB → PB)
Q341, 342 : INVERTER (X2 → X2)
Q344 : INVERTER (DECK I REC → REC)
Q343 : INVERTER (DECK I REC → REC)
REMOTE CONTROL
Q355 : INPUT PORT EXPANDER I
Q310, 311 : DECK I BIAS AMP
Q312 : DECK I BIAS SWITCH (DECK I REC → ON)
Q118, 218 : DECK II REC EQ SELECTOR
Q313 : DECK I BIAS LEVEL CONTROL
Q317 : DECK II BIAS LEVEL CONTROL
V107, 207 : REC BIAS ADJ (DECK I)
V108, 208 : REC BIAS ADJ (DECK II)
Q318, 319 : BIAS OSCILLATOR
MAIN OSC
Q320 : OSC SWITCH
L301 : BIAS AMP ADJ (DECK I)
L302 : BIAS AMP ADJ (DECK II)
Q314, 315 : DECK II BIAS AMP
Q316 : DECK II BIAS SWITCH (DECK II REC → ON)
V301 : ERASE CURRENT ADJ (DECK I)
V302 : ERASE CURRENT ADJ (DECK II)
Q321 : INVERTER (DECK I CrO2 → CrO2)
Q322 : INVERTER (DECK I METAL → METAL)
Q323 : INVERTER (DECK I CrO2 → CrO2)
Q324 : INVERTER (DECK I METAL → METAL)
Q327 : INVERTER (LINE MUTE → LINE MUTE)
Q328 : INVERTER (BIAS → BIAS)
Q329 : INVERTER (PLAY → PLAY)
Q330 : MS SENSE SWITCH (PLAY → OFF)
Q331 : BLANK DETECTOR
LINE IN
Q120 : BUFFER AMP
INDICATOR UNIT (1/2)
V1301 : REC LEVEL
TAPE TRANSPORT UNIT (DECK II) (3/5)
S2004 : METAL TAPE DETECTOR RSG-162
S2005 : CrO2 TAPE DETECTOR RSG-162
S1905 : CrO2 TAPE DETECTOR RSG-162
S1904 : METAL TAPE DETECTOR RSG-162
TAPE TRANSPORT UNIT (DECK I) (3/5)
Q101, 108, 201, 208, 302, 305, 309, Q318 ~ 320, 345 ~ 347, 359 ~ 362 2SC1740S
Q102, 104 ~ 106, 110, 111, 114, 202, Q204 ~ 206, 210, 211, 214, 303, 307, Q308, 329, 330, 334, 335, 339, 341, Q342, 353, 354 2SC2412K
Q103, 109 M5220L
Q107, 113, 116, 120 M5218L
Q112, 115, 121, 212, 215, 221 2SD1302
Q117, 118, 218, 352 IR2C30
Q119 M5218P
Q301, 304, 340 DTC114EK
Q338 DTA124K
Q306, 321 ~ 328, 343, 344 2SA1037K
Q310 ~ 312, 314 ~ 316 2SC2060
Q313, 317 2SD1276
Q331 BA335
Q332, 333, 336, 337 BU4066B or TC4066BP
Q348 ~ 351 2SC3246
Q355, 356 LC7800
Q357 PD3031A
Q358, 363 M5233P or NJM2903D
D301 ~ 306, 311 ~ 322 1S2473
D307 ~ 310 DAN202K


7
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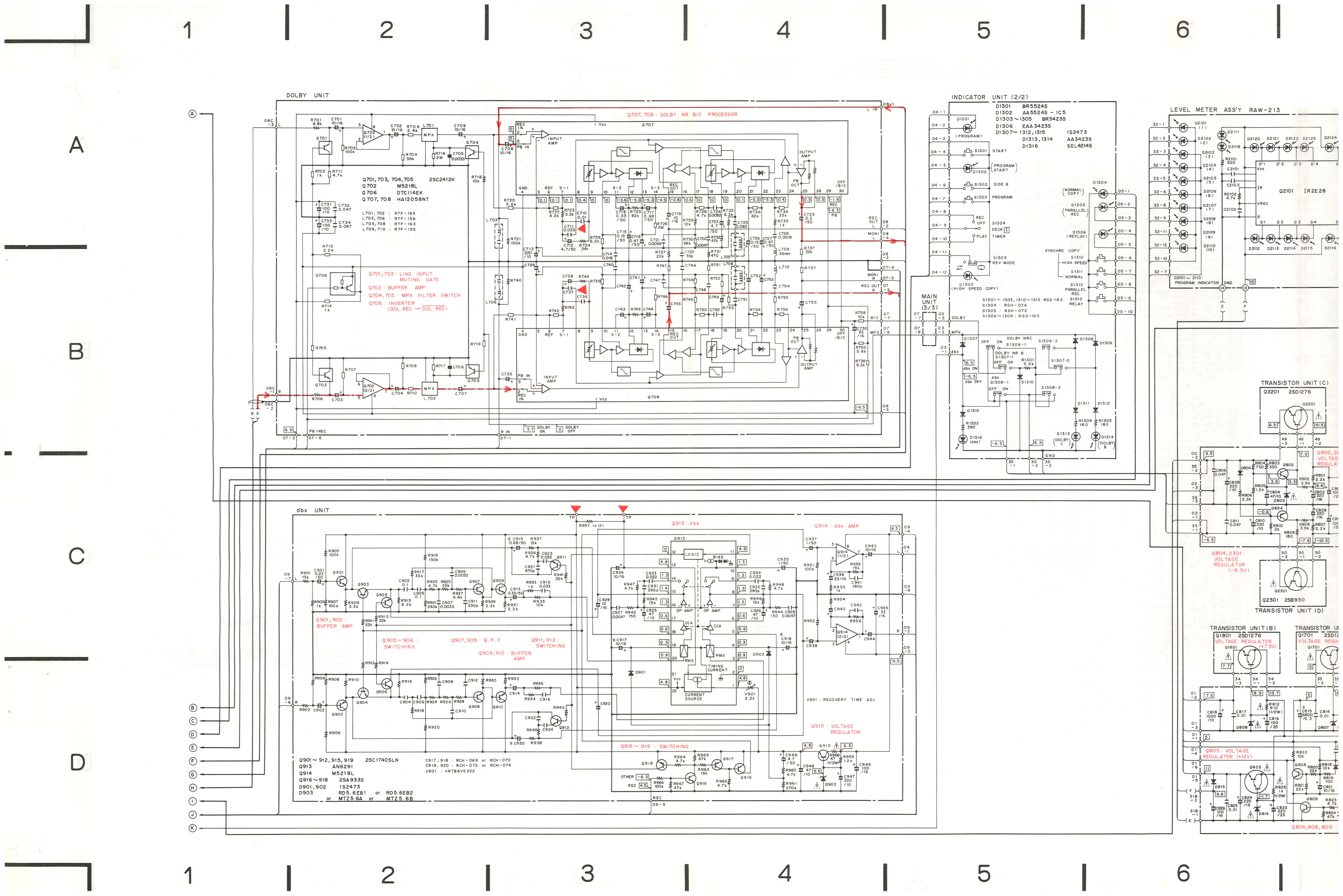
11
12
A
B
C
D
Q340 : INVERTER (DECK I PB → PB)
Q357 : SYSTEM CONTROL MICROCOMPUTER
Q344 : INVERTER (DECK II REC → REC)
Q343 : INVERTER (DECK I REC → REC)
Q348～351 : KEY SCAN BUFFER AMP
Q353 : DECK I HIGH SPEED SWITCH
Q354 : DECK II HIGH SPEED SWITCH
Q345 : LED DRIVER (HIGH SPEED COPY)
Q347 : LED DRIVER (PROGRAM START)
Q346 : LED DRIVER (NORMAL SPEED COPY)
Q356 : INPUT PORT EXPANDER 2
Q355 : INPUT PORT EXPANDER 1
Q352 : INDICATOR DRIVER
REMOTE CONTROL
Q358(1/2),359,360 : DECK I LEADER TAPE DET
V303 : LEADER TAPE DET. ADJ (DECK I)
V304 : LEADER TAPE DET. ADJ (DECK II)
Q363 : SENSING END DETECTOR
Q329 : INVERTER (PLAY → PLAY)
Q330 : MS SENSE SWITCH (PLAY → OFF)
Q121,221 : MUTING GATE (LINE MUTE)
Q119 : HEADPHONE AMP
Q358(2/2),361,Q362 : DECK II LEADER TAPE DET
LINE OUT
PHONES
HEADPHONE JACK UNIT
TAPE TRANSPORT UNIT (DECK II) (4/5)
TAPE TRANSPORT UNIT (DECK I) (4/5)
(LEADER TAPE SENSOR)
(TAPE END SENSOR)
Q2001/D2001 : RXC-049
Q2002/D2002 : NJL5141E
Q1901/D1901 : RXC-049
Q1902/D1902 : NJL5141E
MAIN UNIT (2/3)
MOTOR DRIVE UNIT (II)
MOTOR DRIVE UNIT (I)
Q1501 : REEL MOTOR DRIVER (DECK II)
Q1502 : ASSIST MOTOR DRIVER (DECK II)
Q1503 : REEL MOTOR TORQUE SELECTOR (DECK II PLAY → ON)
Q1501,1502 BA6109
Q1503 DTC124K
D1501 RD5.6EB3 or MTZ5.6C
Q1401 : REEL MOTOR DRIVER (DECK I)
Q1402 : ASSIST MOTOR DRIVER (DECK I)
Q1403 : REEL MOTOR TORQUE SELECTOR (DECK I PLAY → ON)
Q1401,1402 BA6109
Q1403 DTC124K
D1401 RD5.6EB3 or MTZ5.6C
TAPE TRANSPORT UNIT (DECK II) (5/5)
TAPE TRANSPORT UNIT (DECK I) (5/5)
CM : CAPSTAN MOTOR RXM-124
RM : REEL MOTOR RXM-122
AM : ASSIST MOTOR RXM-134
ERASE PREVENT DETECTOR (REV)
CASSETTE DOOR
ERASE PREVENT DETECTOR (FWD)
S2001～2003 : RSG-162
S1901～1903 : RSG-162
MECHANISM MODE CODE ENCODER
DOOR LIGHTING UNIT (I)
DOOR LIGHTING UNIT (II)
D1001～1003 MU03-3201
D1004 MU03-2250
D1101 MU03-2250
D1102～1104 MU03-3201
OPERATION SWITCH UNIT
D1201,1202 AA3423S
S1201～1212 : RSG-163
J01
J32
J05
J04
J31C
J08
J07
J06A
J02
J09
J03


DOLBY UNIT
Q707, 708 : DOLBY NR B/C PROCESSOR
Q701, 703, 704, 705 2SC2412K
Q702 M5218L
Q706 DTC114EK
Q707, 708 HA12058NT
L701, 702 : RTF-165
L703, 706 : RTF-156
L705, 708 : RTF-163
L709, 710 : RTF-155
Q701, 703 : LINE INPUT MUTING GATE
Q702 : BUFFER AMP
Q704, 705 : MPX FILTER SWITCH
Q706 : INVERTER (DOL.REC → DOL.REC)
INPUT AMP
OUTPUT AMP
REC OUT
PB OUT
PB/REC
DOLBY ON
DOLBY OFF
INDICATOR UNIT (2/2)
D1301 BR5524S
D1302 AA5524S-1C5
D1303~1305 BR3423S
D1306 EAA3423S
D1307~1312, 1315 1S2473
D1313, 1314 AA3423S
D1316 SEL4214S
S1301 START
(PROGRAM START)
S1302 SIDE B
S1303 PROGRAM
S1304 DECK TIMER
S1305 REV MODE
(HIGH SPEED COPY)
SYNCHRO COPY
S1310 HIGH SPEED
S1311 NORMAL
S1312 PARALLEL REC
S1313 RELAY
S1301~1303, 1310~1313 : RSG-163
S1304 : RSH-074
S1305 : RSH-073
S1306~1309 : RSG-165
MAIN UNIT (3/3)
DOLBY NRC
dbx ON
dbx OFF
LEVEL METER ASS'Y RAW-213
Q2101 IR2E28
D2101~2110 : PROGRAM INDICATOR
TRANSISTOR UNIT (C)
Q2201 2SD1276
Q2301 2SB950
TRANSISTOR UNIT (D)
Q802, 2201 : VOLTAGE REGULATOR
Q804, 2301 : VOLTAGE REGULATOR (-6.5V)
TRANSISTOR UNIT (B)
Q1801 2SD1276
VOLTAGE REGULATOR (+7.5V)
Q1701 2SD1
Q805 : VOLTAGE REGULATOR (+12V)
Q806, 808, 809
dbx UNIT
Q913 : dbx
Q914 : dbx AMP
Q901, 902 : BUFFER AMP
Q903~906 SWITCHING
Q907, 908 : B.P.F
Q909, 910 : BUFFER AMP
Q911, 912 : SWITCHING
Q915 : VOLTAGE REGULATOR
Q916~919 : SWITCHING
V901 : RECOVERY TIME ADJ
LOGIC
BIAS
OP AMP
CCA
RMS
TIMING CURRENT
CURRENT SOURCE
Q901~912, 915, 919 2SC1740SLN
Q913 AN6291
Q914 M5218L
Q916~918 2SA933S
D901, 902 1S2473
D903 RD5.6EB1 or RD5.6EB2 or MTZ5.6A or MTZ5.6B
C917, 918 : RCH-069 or RCH-070
C919, 920 : RCH-073 or RCH-074
V901 : VRTB6VS222
A
B
C
D
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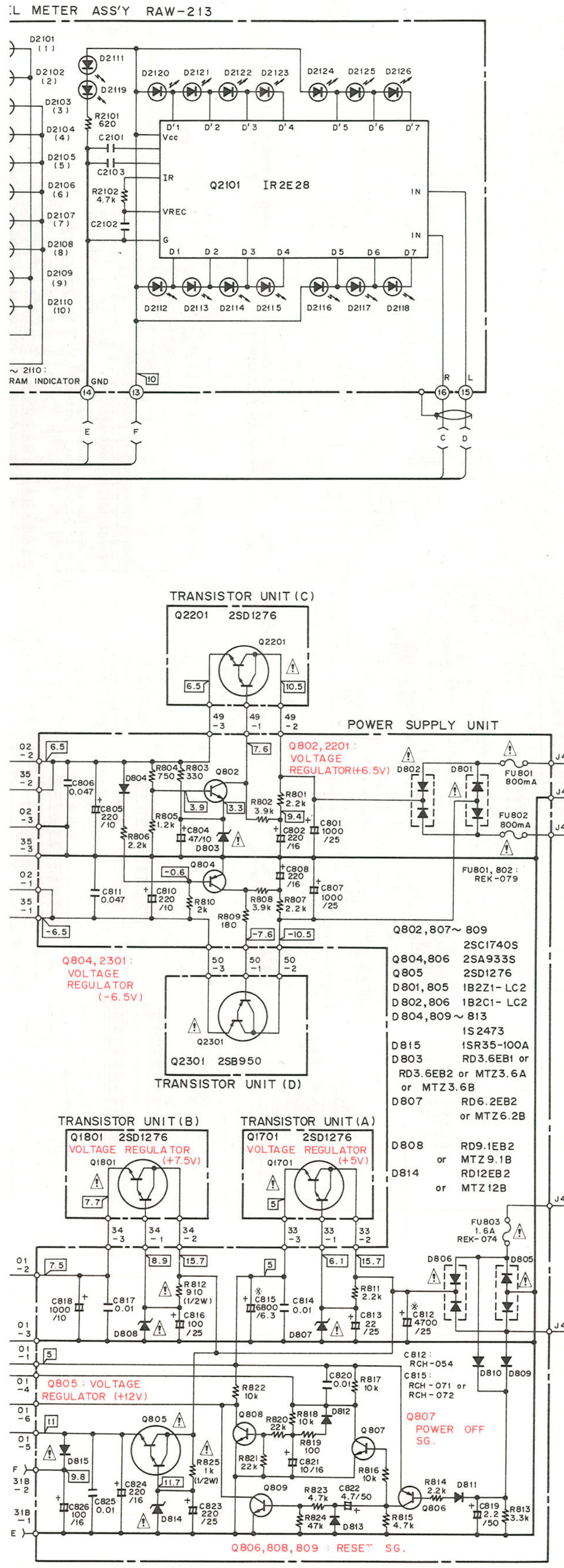

L METER ASS'Y RAW-213
D2101 (1)
D2102 (2)
D2103 (3)
D2104 (4)
D2105 (5)
D2106 (6)
D2107 (7)
D2108 (8)
D2109 (9)
D2110 (10)
D2111
D2119
D2120 D2121 D2122 D2123 D2124 D2125 D2126
R2101 620
C2101
C2103
R2102 4.7k
C2102
Q2101 IR2E28
Vcc
VREC
IR
IN
D2112 D2113 D2114 D2115 D2116 D2117 D2118
RAM INDICATOR
GND
TRANSISTOR UNIT (C)
Q2201 2SD1276
POWER SUPPLY UNIT
Q802, 2201 : VOLTAGE REGULATOR (+6.5V)
FU801 800mA
FU802 800mA
FU801, 802 : REK-079
T1 RTT-411
YEL
GRY
OR
RED
WHT
Q802,807~809 2SC1740S
Q804,806 2SA933S
Q805 2SD1276
D801,805 1B2Z1-LC2
D802,806 1B2C1-LC2
D804,809~813 1S2473
D815 1SR35-100A
D803 RD3.6EB1 or RD3.6EB2 or MTZ3.6A or MTZ3.6B
D807 RD6.2EB2 or MTZ6.2B
D808 RD9.1EB2 or MTZ9.1B
D814 RD12EB2 or MTZ12B
Q804, 2301 : VOLTAGE REGULATOR (-6.5V)
Q2301 2SB950
TRANSISTOR UNIT (D)
TRANSISTOR UNIT (B)
Q1801 2SD1276
VOLTAGE REGULATOR (+7.5V)
TRANSISTOR UNIT (A)
Q1701 2SD1276
VOLTAGE REGULATOR (+5V)
FU803 1.6A REK-074
C812 : RCH-054
C815 : RCH-071 or RCH-072
Q805 : VOLTAGE REGULATOR (+12V)
Q807 POWER OFF SG.
Q806,808,809 : RESET SG.
C1601 0.01
RCG-008
S1601 POWER
RSA-063
POWER SWITCH UNIT
AC 120V 60Hz
AC POWER CORD RDG-048

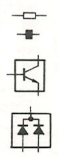
NOTE:
The indicated semiconductors are representative ones only. Other alternative semiconductors may be used and are listed in the parts list.

1. RESISTORS.
Indicated in Ω, ¼W, ⅛ W.±5% tolerance unless otherwise noted k; kΩ, M; MΩ, (F); ±1%, (G); ±2%, (K); ±10%, (M); ±20% tolerance

2. CAPACITORS:
Indicated in capacity (μF)/voltage (V) unless otherwise noted p; pF. Indication without voltage is 50V except electrolytic capacitor.

3. VOLTAGE CURRENT.
▭ ; DC voltage (V) at no input signal

4. OTHERS:
➡ ; Signal route.
⊘ ; Adjusting point.
The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
※ marked capacitors and resistors have parts numbers.


: CHIP RESISTOR
: CHIP CAPACITOR
: CHIP TRANSISTOR
: CHIP DIODE

This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

5. SWITCHES:

TAPE TRANSPORT UNIT (DECK I)
S1901 : ERASE PREVENT DETECTOR (REV) OFF(HOLE) — ON (NON HOLE)
S1902 : CASSETTE DOOR OFF(CLOSE) — ON (OPEN)
S1903 : ERASE PREVENT DETECTOR (FWD) OFF(HOLE) — ON (NON HOLE)
S1904 : METAL TAPE DETECTOR
S1905 : CrO2 TAPE DETECTOR

	METAL	CrO2	NORM
S1904	OFF	ON	ON
S1905	OFF	OFF	ON

TAPE TRANSPORT UNIT (DECK II)
S2001 : ERASE PREVENT DETECTOR (REV) OFF(HOLE) — ON (NON HOLE)
S2002 : CASSETTE DOOR OFF(CLOSE) — ON (OPEN)
S2003 : ERASE PREVENT DETECTOR (FWD) OFF(HOLE) — ON (NON HOLE)
S2004 : METAL TAPE DETECTOR
S2005 : CrO2 TAPE DETECTOR

	METAL	CrO2	NORM
S2004	OFF	ON	ON
S2005	OFF	OFF	ON

POWER SWITCH UNIT
S1601 : POWER OFF — ON

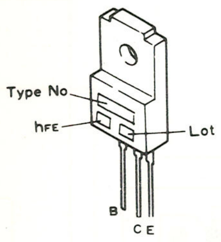
OPERATION SWITCH UNIT
S1201 : ◘ (REC MUTE) /10 N.O. (NORMAL OFF)
S1202 : ● (REC) /9 N.O.
S1203 : ❚❚ (PAUSE) /8 N.O.
S1204 : + (MS/SKIP +) /7 N.O.
S1205 : − (MS/SKIP −) /6 N.O.
S1206 : ► (FWD PLAY) /5 N.O.
S1207 : ◄ (REV PLAY) /4 N.O.
S1208 : ■ (STOP) /3 N.O.
S1209 : ►► (FF) /2 N.O.
S1210 : ◄◄ (REW) /1 N.O.
S1211 : II (DECK II SEL.) N.O.
S1212 : I (DECK I SEL.) N.O.

INDICATOR UNIT
S1301 : START N.O. (NORMAL OFF)
S1302 : SIDE B N.O.
S1303 : PROGRAM N.O.
S1304 : DECK I TIMER REC — OFF — PLAY
S1305 : REV MODE ⇄ — ⟲
S1306 : DOLBY NR C ON — OFF
S1307 : DOLBY NR B ON — OFF
S1308 : dbx ON — OFF
S1309 : NOISE REDUCTION OFF ON — OFF
S1310 : SYNCHRO COPY HIGH SPEED N.O. (NORMAL OFF)
S1311 : SYNCHRO COPY NORMAL N.O.
S1312 : PARALLEL REC N.O.
S1313 : RELAY N.O.

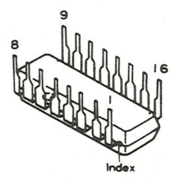
The underlined indicates the switch position.

Playback signal route (Lch) ————
Recording signal route (Rch) — - —

2SD1276
2SB950


Type No
hFE
Lot
B
C E

IR2C30


9
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16
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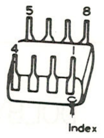
Index

M5218P
M5233P
NJM2903D



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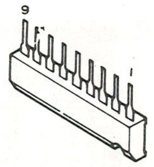

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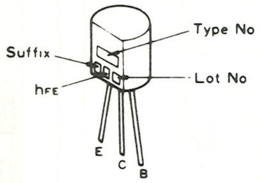
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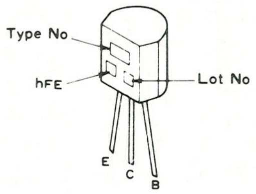
2SC2060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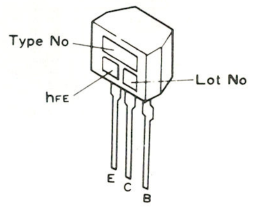
2SA933S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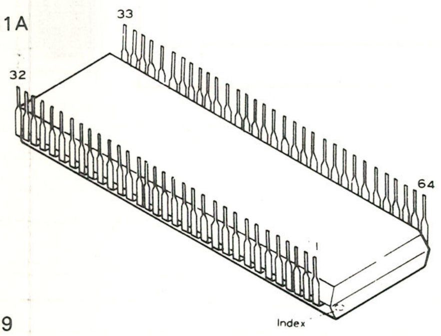
PD3031A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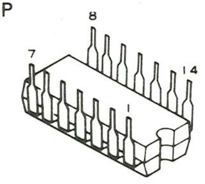
Index

BU4066BP
TC4066BP



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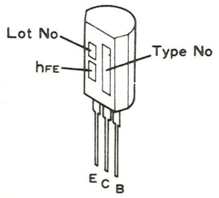
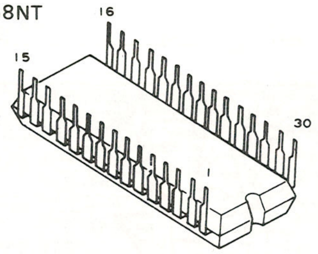

Lot No
hFE
Type No
E
C
B

HA12058NT



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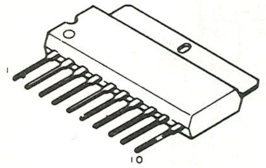

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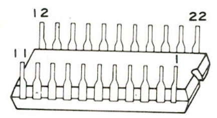
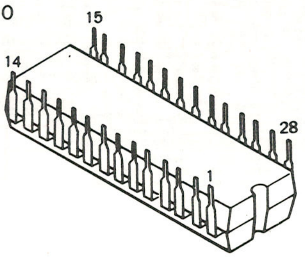
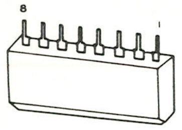


LC7800

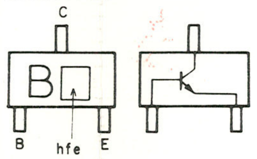


M5220L
M5218L

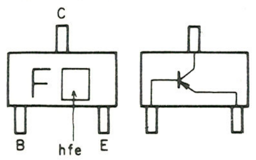


- **Chip elements**

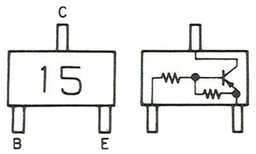
2SC2412K



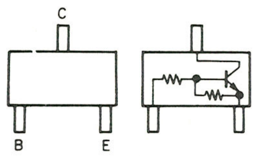
2SA1037K



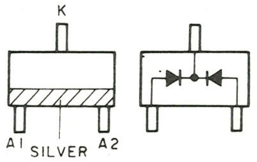
DTA124EK



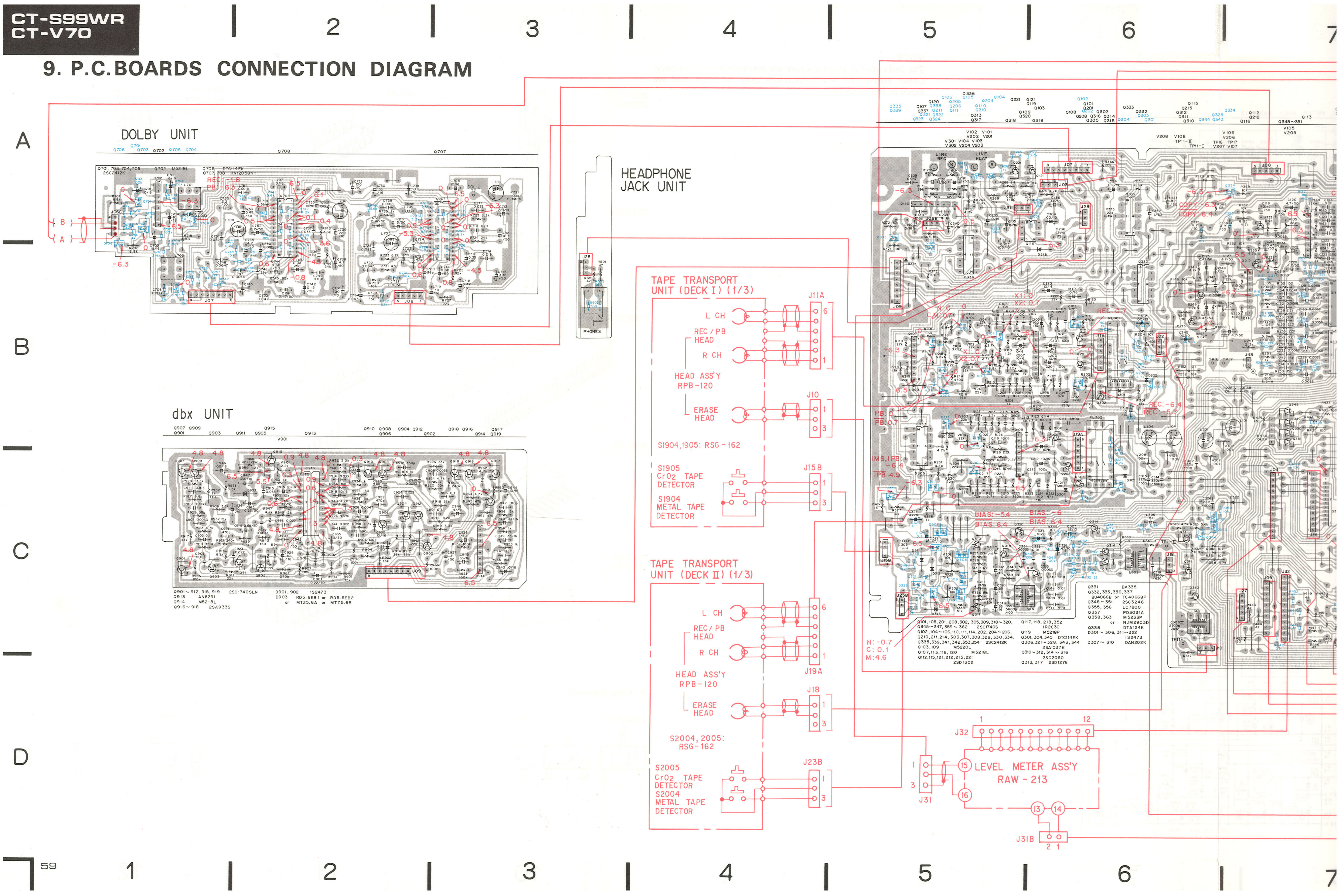
DTC124EK
DTC114EK

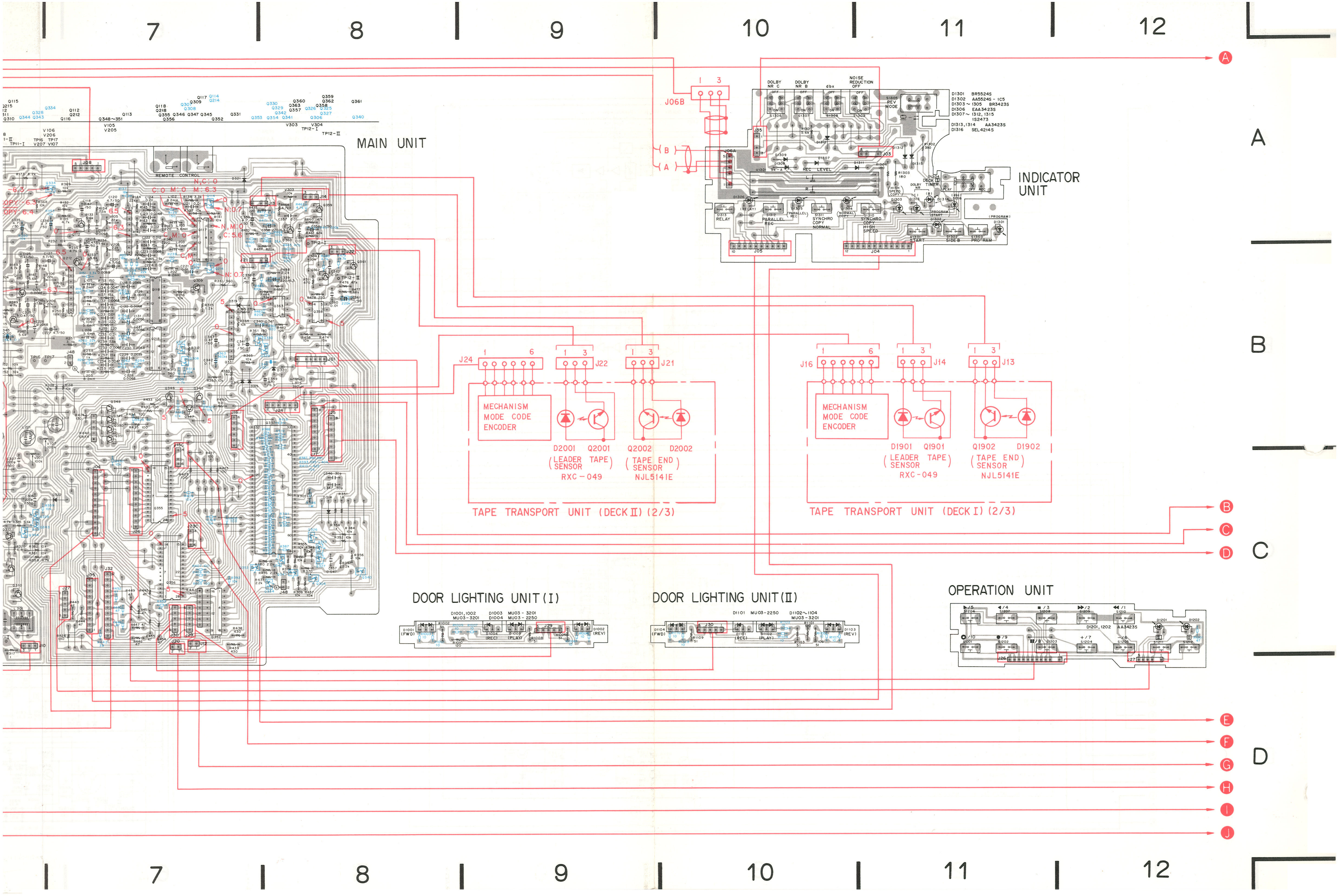


DAN202K


K
A1
SILVER
A2

9. P.C.BOARDS CONNECTION DIAGRAM


1
2
3
4
5
6
7
A
B
C
D
DOLBY UNIT
HEADPHONE JACK UNIT
PHONES
J28
J07
J08
J09
dbx UNIT
TAPE TRANSPORT UNIT (DECK I) (1/3)
L CH
REC / PB HEAD
R CH
HEAD ASS'Y RPB-120
ERASE HEAD
J11A
J10
J15B
S1904, 1905: RSG-162
S1905 CrO2 TAPE DETECTOR
S1904 METAL TAPE DETECTOR
TAPE TRANSPORT UNIT (DECK II) (1/3)
L CH
REC/ PB HEAD
R CH
HEAD ASS'Y RPB-120
ERASE HEAD
J19A
J18
J23B
S2004, 2005: RSG-162
S2005 CrO2 TAPE DETECTOR
S2004 METAL TAPE DETECTOR
J32
LEVEL METER ASS'Y RAW-213
J31
J31B
N: -0.7
C: 0.1
M: 4.6
LINE REC
LINE PLAY
BIAS: -5.4
BIAS: 6.4
REC: -6.4
REC: -5.7
PB: 0
PB: 0.7
IMS, IPB: -6.4
IPB: 4.9
COPY: 6.3
COPY: 6.4
Q901~912, 915, 919 2SC1740SLN
Q913 AN6291
Q914 M5218L
Q916~918 2SA933S
D901, 902 IS2473
D903 RD5.6EB1 or RD5.6EB2 or MTZ5.6A or MTZ5.6B
Q701, 703, 704, 705 2SC2412K
Q702 M5218L
Q706 DTC114EK
Q707, 708 HA12058NT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MAIN UNIT
REMOTE CONTROL
J06B
J06A
INDICATOR UNIT
DOLBY NR C
DOLBY NR B
dbx
NOISE REDUCTION OFF
REV MODE
D1301 BR5524S
D1302 AA5524S - 1C5
D1303 ~ 1305 BR3423S
D1306 EAA3423S
D1307 ~ 1312, 1315 1S2473
D1313, 1314 AA3423S
D1316 SEL4214S
S1313 RELAY
S1312 PARALLEL REC
S1311 SYNCHRO COPY NORMAL
S1310 SYNCHRO COPY HIGH SPEED
S1301 START
S1302 SIDE B
S1303 PROGRAM
DECK TIMER
J05
J04
J03
J35
J24
J22
J21
J16
J14
J13
MECHANISM MODE CODE ENCODER
D2001 Q2001
(LEADER TAPE SENSOR)
RXC-049
Q2002 D2002
(TAPE END SENSOR)
NJL5141E
TAPE TRANSPORT UNIT (DECK Ⅱ) (2/3)
D1901 Q1901
(LEADER TAPE SENSOR)
RXC-049
Q1902 D1902
(TAPE END SENSOR)
NJL5141E
TAPE TRANSPORT UNIT (DECK Ⅰ) (2/3)
DOOR LIGHTING UNIT (Ⅰ)
D1001, 1002 MU03-3201
D1003 D1004 MU03-3201 MU03-2250
J29
DOOR LIGHTING UNIT (Ⅱ)
D1101 MU03-2250
D1102 ~ 1104 MU03-3201
J30
OPERATION UNIT
D1201, 1202 AA3423S
J26
J27
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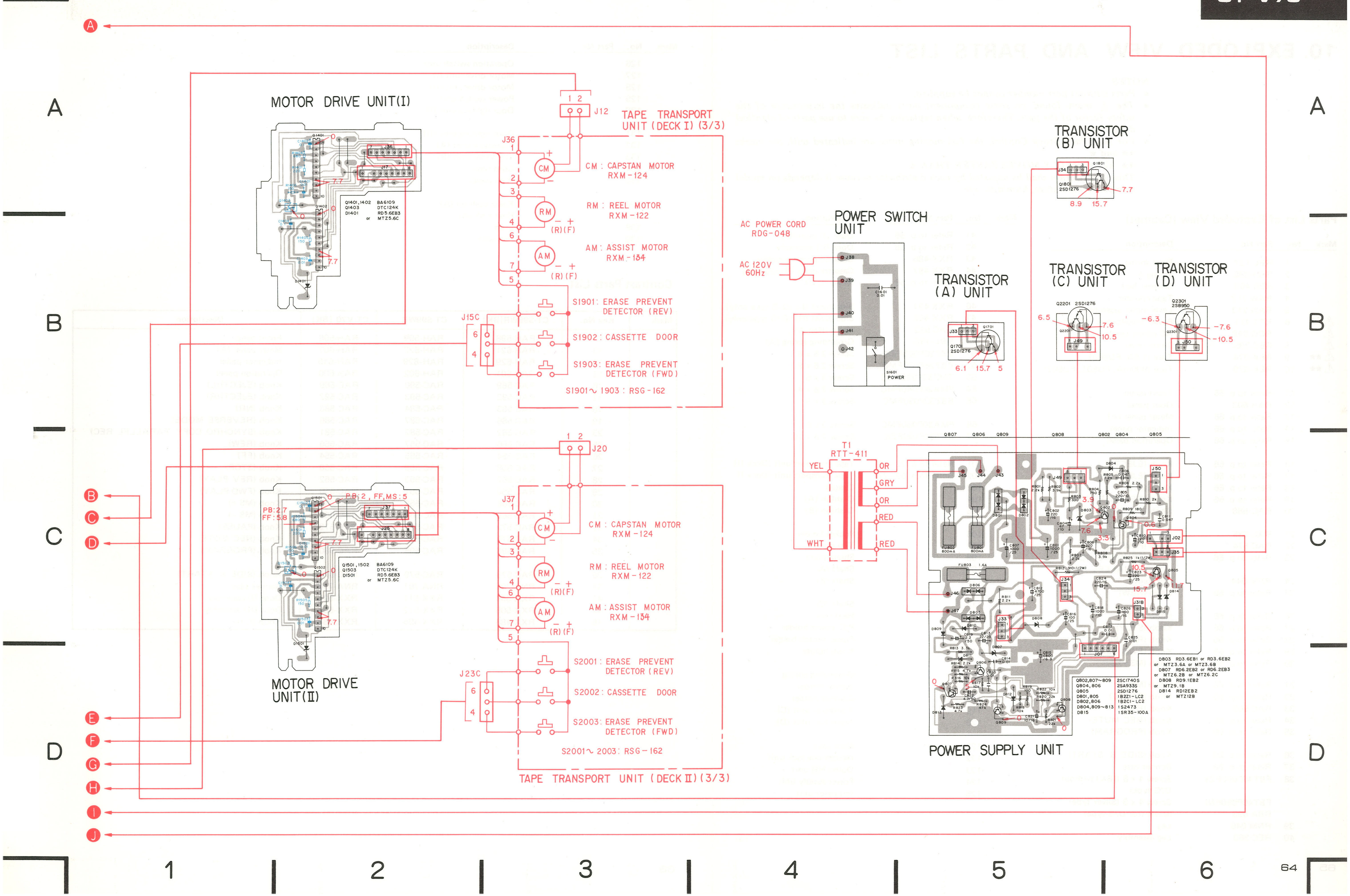
MOTOR DRIVE UNIT(I)
Q1401,1402 BA6109
Q1403 DTC124K
D1401 RD5.6EB3
or MTZ5.6C
J12
TAPE TRANSPORT UNIT (DECK I) (3/3)
J36
CM : CAPSTAN MOTOR RXM-124
RM : REEL MOTOR RXM-122
AM : ASSIST MOTOR RXM-134
(R) (F)
J15C
S1901 : ERASE PREVENT DETECTOR (REV)
S1902 : CASSETTE DOOR
S1903 : ERASE PREVENT DETECTOR (FWD)
S1901～1903 : RSG-162
PB:2, FF,MS:5
PB:2.7
FF:5.8
J20
J37
MOTOR DRIVE UNIT(II)
Q1501,1502 BA6109
Q1503 DTC124K
D1501 RD5.6EB3
or MTZ5.6C
J23C
CM : CAPSTAN MOTOR RXM-124
RM : REEL MOTOR RXM-122
AM : ASSIST MOTOR RXM-134
S2001 : ERASE PREVENT DETECTOR (REV)
S2002 : CASSETTE DOOR
S2003 : ERASE PREVENT DETECTOR (FWD)
S2001～2003 : RSG-162
TAPE TRANSPORT UNIT (DECK II) (3/3)
AC POWER CORD RDG-048
AC 120V 60Hz
POWER SWITCH UNIT
S1601 POWER
C1601 0.01
T1 RTT-411
YEL
WHT
OR
GRY
OR
RED
RED
TRANSISTOR (A) UNIT
Q1701 2SD1276
6.1 15.7 5
TRANSISTOR (B) UNIT
Q1801 2SD1276
7.7 8.9 15.7
TRANSISTOR (C) UNIT
Q2201 2SD1276
6.5 7.6 10.5
TRANSISTOR (D) UNIT
Q2301 2SB950
-6.3 -7.6 -10.5
POWER SUPPLY UNIT
Q802,807～809 2SC1740S
Q804,806 2SA933S
Q805 2SD1276
D801,805 1B2Z1-LC2
D802,806 1B2C1-LC2
D804,809～813 1S2473
D815 1SR35-100A
D803 RD3.6EB1 or RD3.6EB2
or MTZ3.6A or MTZ3.6B
D807 RD6.2EB2 or RD6.2EB3
or MTZ6.2B or MTZ6.2C
D808 RD9.1EB2
or MTZ9.1B
D814 RD12EB2
or MTZ12B
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10. EXPLODED VIEW AND PARTS LIST

NOTES:

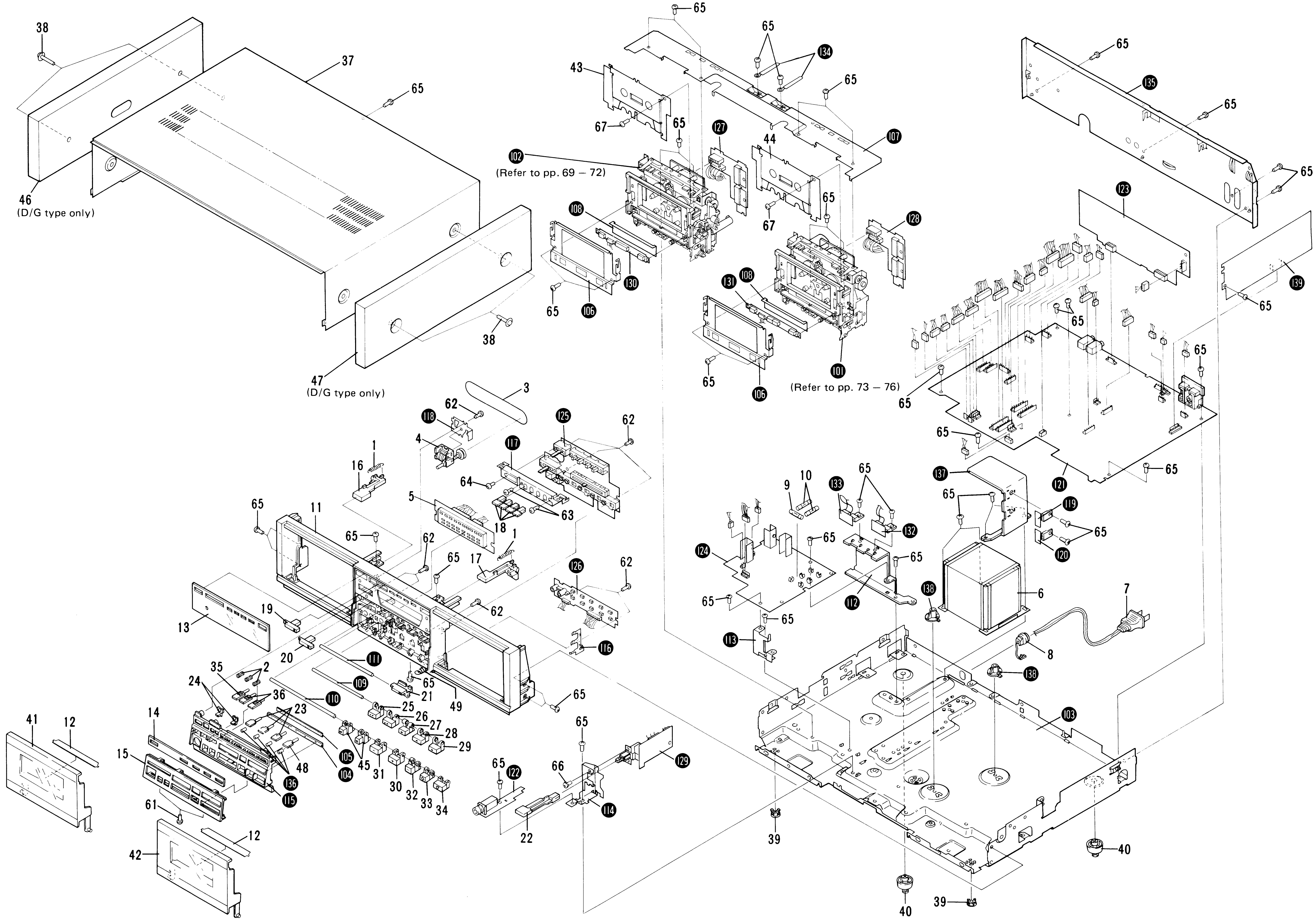
- *Parts without part number cannot be supplied.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ GENERALLY MOVES FASTER THAN ★.
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

Parts List of Exploded View (Cabinet)

Mark	No.	Part No.	Description
	1	RBL-137	Eject spring
	2	RBH-986	Spring A
	3	REB-468	Counter belt
	4	RAW-212	Tape counter
	5	RAW-213	Level meter assembly
⚠ ★	6	RTT-411	Power transformer (120V)
⚠	7	RDG-048	AC power cord
⚠	8	REC-395	Strain relief
⚠ ★★	9	REK-074	Fuse (1.6A, FU803)
⚠ ★★	10	REK-079	Fuse (800mA, FU801, FU802)
	11	Refer to p. 66	Front panel
	12	RAH-603	Door panel
	13	Refer to p. 66	Meter panel (A)
	14	Refer to p. 66	Indicator panel
	15	Refer to p. 66	Operation panel
	16	Refer to p. 66	Knob (EJECT)(L)
	17	Refer to p. 66	Knob (EJECT)(R)
	18	Refer to p. 66	Knob (NR)
	19	Refer to p. 66	Knob (REVERSE MODE)
	20	RAC-588	Knob (TIMER STD-BY)
	21	RAC-585	Knob (REC LEVEL)
	22	RAC-574	Knob (POWER)
	23	Refer to p. 66	Knob (SYNCHRO COPY, PARALLEL REC)
	24	RNM-044	LED lens
	25	Refer to p. 66	Knob (REW)
	26	Refer to p. 66	Knob (FF)
	27	Refer to p. 66	Knob (STOP)
	28	Refer to p. 66	Knob (REV PLAY)
	29	Refer to p. 66	Knob (FWD PLAY)
	30	Refer to p. 66	Knob (MS +)
	31	Refer to p. 66	Knob (MS –)
	32	Refer to p. 66	Knob (PAUSE)
	33	RAC-562	Knob (REC)
	34	Refer to p. 66	Knob (REC MUTE)
	35	Refer to p. 66	Knob (PROGRAM)
	36	Refer to p. 66	Knob (SIDE B, START)
	37	Refer to p. 66	Bonnet case
	38	FBT40P080FZK	Screw 4 x 8 ([BK] without D/G type)
		FBT40P080FNi	Screw 4 x 8 (Silver type)
		RBA-093	Screw (for D/G type)
	39	RNM-046	Leg
	40	REC-369	Leg assembly
	41	Refer to p. 66	Door (I) assembly
	42	Refer to p. 66	Door (II) assembly
	43	RXX-486	Cassette plate assembly
	44	RXX-487	Cassette plate (R) assembly
	45	Refer to p. 66	Knob (I, II)
	46	RXX-491	Side panel (L) (D/G type only)
	47	RXX-492	Side panel (R) (D/G type only)
	48	RAC-582	Knob (RELAY)
	49	RBL-156	Grounding spring (A)
	61	BBZ26P060FZK	Screw 2.6 x 6
	62	BBZ26P080FMC	Screw 2.6 x 8
	63	TMZ30P060FMC	Screw 3 x 6
	64	PMA26P040FMC	Screw 2.6 x 4
	65	BBZ30P080FMC	Screw 3 x 8
	66	PMA30P060FMC	Screw 3 x 6
	67	BCT26P100FZK	Screw 2.6 x 10
	101	Refer to p. 73–76	Tape transport unit (Deck II)
	102	Refer to p. 69–72	Tape transport unit (Deck I)
	103		Chassis
	104		Cushion (A)
	105		Cushion (B)
	106		Pocket holder
	107		Top plate
	108		Shield plate
	109		Shaft (A)
	110		Shaft (B)
	111		Shaft (C)
	112		Heat sink
	113		P.C. board holder
	114		Power switch holder
	115		Knob holder
	116		Grounding spring
	117		Switch holder
	118		Counter holder
	119		Transistor unit (C)
	120		Transistor unit (D)
	121		Main unit
	122		Headphone jack unit
	123		Dolby NR unit
	124		Power supply unit
	125		Indicator unit
	126		Operation switch unit
	127		Motor drive unit (I)
	128		Motor drive unit (II)
	129		Power switch unit
	130		Door lighting unit (I)
	131		Door lighting unit (II)
	132		Transistor unit (A)
	133		Transistor unit (B)
	134		Cord fixer
	135		Rear panel
	136		Knob cushion (A)
	137		Heat sink (A)
	138		Stud
	139		dbx unit

Contrast Parts List

Mark	Key No.	CT-S99WR[BK]	CT-S99WR	CT-V70 [BK]	Description
	11	RAH-598	RAH-599	RAH-598	Front panel
	13	RAH-621	RAH-622	RAH-607	Meter panel (A)
	14	RAH-629	RAH-629	RAH-615	Indicator panel
	15	RAH-601	RAH-602	RAH-600	Operation panel
	16	RAC-589	RAC-590	RAC-589	Knob (EJECT)(L)
	17	RAC-592	RAC-593	RAC-592	Knob (EJECT)(R)
	18	RAC-583	RAC-584	RAC-583	Knob (NR)
	19	RAC-586	RAC-587	RAC-586	Knob (REVERSE MODE)
	23	RAC-582	RAC-582	RAC-581	Knob (SYNCHRO COPY, PARALLEL REC)
	25	RAC-556	RAC-557	RAC-556	Knob (REW)
	26	RAC-554	RAC-555	RAC-554	Knob (FF)
	27	RAC-558	RAC-559	RAC-558	Knob (STOP)
	28	RAC-552	RAC-553	RAC-552	Knob (REV PLAY)
	29	RAC-550	RAC-551	RAC-550	Knob (FWD PLAY)
	30	RAC-566	RAC-565	RAC-566	Knob (MS +)
	31	RAC-569	RAC-568	RAC-569	Knob (MS –)
	32	RAC-572	RAC-573	RAC-572	Knob (PAUSE)
	34	RAC-570	RAC-571	RAC-570	Knob (REC MUTE)
	35	RAC-595	RAC-595	RAC-580	Knob (PROGRAM)
	36	RAC-578	RAC-579	RAC-578	Knob (SIDE B, START)
	37	RNA-700	RNA-701	RNA-700	Bonnet case
	41	RXX-504	RXX-511	RXX-502	Door (I) assembly
	42	RXX-505	RXX-512	RXX-503	Door (II) assembly
	45	RXX-488	RXX-495	RXX-488	Knob (I, II)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(D/G type only)
(D/G type only)
(Refer to pp. 69 – 72)
(Refer to pp. 73 – 76)

NOTES:
- *Parts without part number cannot be supplied.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ GENERALLY MOVES FASTER THAN ★.
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

Parts List of Tape Transport Unit (Deck I)

Mark	No.	Part No.	Description
	1	REF-025	Reflection plate
	2	RBL-091	Eject prevention spring
	3	RBK-188	Hold spring (L)
	4	RBK-189	Hold spring (R)
	5	RBL-076	Stopper spring (R)
	6	RBL-077	Eject arm spring
	7	RXC-036	Damper assembly
	8	RBL-078	Rod (R)
	9	RNH-349	Hold spring
	10	RBL-079	Door spring (R)
	11	RXC-037	Flywheel assembly
	12	RBF-030	Oil stopper washer
	13	WA26D045D025	Washer
★★	14	REB-519	Capstan belt
	15	RBL-080	SB spring (L)
	16	RBL-081	SB spring (R)
★★	17	RXC-038	Pinch roller assembly (L)
	18	RBL-082	Pinch roller spring (L)
★★	19	RXC-039	Pinch roller assembly (R)
	20	RBL-083	Pinch roller spring (R)
	21	WA21D070D013	Washer
	22	RXC-040	Reel base assembly
	23	RXC-075	TU reel base assembly
	24	RBF-057	Washer
★★	25	RXC-076	Idler assembly
	26	RNL-926	C/R slide plate
	27	RBK-191	Damper spring
	28	RXC-042	Head base plate
	29	RXC-043	Head housing
	30	RBK-184	Azimuth spring
	31	RBA-092	Azimuth screw
	32	REB-521	Cushion
	33	RBL-085	Rotator spring
	34	RBL-086	HB spring
	35	RBL-087	Spring (L)
	36	RNL-929	Tape guide
	37	RBL-088	Spring (R)
	38	RNL-930	Nut
	39	REF-024	Steel ball
	40	RBK-185	Hold spring
	41	RBL-089	CR slide spring
	42	RXC-044	Gear assembly
	43	RNL-932	Switching slide plate
	44	RNM-103	Worm gear
	45	RNL-934	Idler gear
	46	RBF-057	Washer
	47	RBK-187	Thrust spring
	48	RBL-090	BKT spring
	49	RNL-936	Brake lever (L)
	50	RNL-937	Brake lever (R)
	51	RBL-092	Brake spring
	52	RNR-321	Sensor panel
	53	RNR-270	P.C. board
★★	54	RSG-162	Tact switch
★	55	NJL5141E	Photo-interrupter
	56	RKS-007	Connector (6-P)
	57	RKS-009	Connector (3-P)
★★	58	RPB-120	Tape head assembly
	59	RXC-049	Sensor assembly
	60	RKS-013	Connector (3-P)
	61	REC-371	Wire tie
★★	62	RXM-122	Reel motor assembly
★★	63	RXM-134	Assist motor assembly
★★	64	RXM-124	Capstan motor assembly
	71	PVZ30P040FMC	Screw 3 x 4
	72	YE20FUC	Washer E-type
	73	PMA20Y050FMC	Screw 2 x 5
	74	PMZ14P050FNi	Screw 1.4 x 5
	75	PVZ30P060FMC	Screw 3 x 6
	76	PRZ20P060FMC	Screw 2 x 6
	77	PRZ26P080FMC	Screw 2.6 x 8
	78	PMA20P030FZB	Screw 2 x 3
	79	WB30FMC	Washer
	80	PMA26P040FMC	Screw 2.6 x 4
	81	YE30FUC	Washer E-type
	82	YE25FUC	Washer E-type
	83	PMZ26P040FMC	Screw 2.6 x 4
	84	iCZ20P120FMC	Screw 2 x 12
	101		Chassis
	102		Motor bracket
	103		Thrust screw
	104		Hold plate
	105		Grounding plate
	106		Wire holder
	107		Eject prevention arm (R)
	108		Spacer
	109		Cord fixer
	110		Bracket assembly
	111		Stopper (R)
	112		Eject arm (R)
	113		Side plate (A)
	114		Door frame
	115		Slide base (L)
	116		Slide base (R)
	117		Spacer
	118		Assit motor bracket (R)
	119		REC detector assembly
	120		Metal detector assembly
	121		Eject detector assembly
	122		Detector arm
	123		Spacer
	124		Connector (6-P)
	125		Connector (3-P)
	126		Connector (6-P)
	127		Connector (7-P)
	128		....
	129		....
	130		....
	131		....
	132		....
	133		Connector (6-P)
	134		Connector (2-P)
	135		Shield plate
	136		Shield plate

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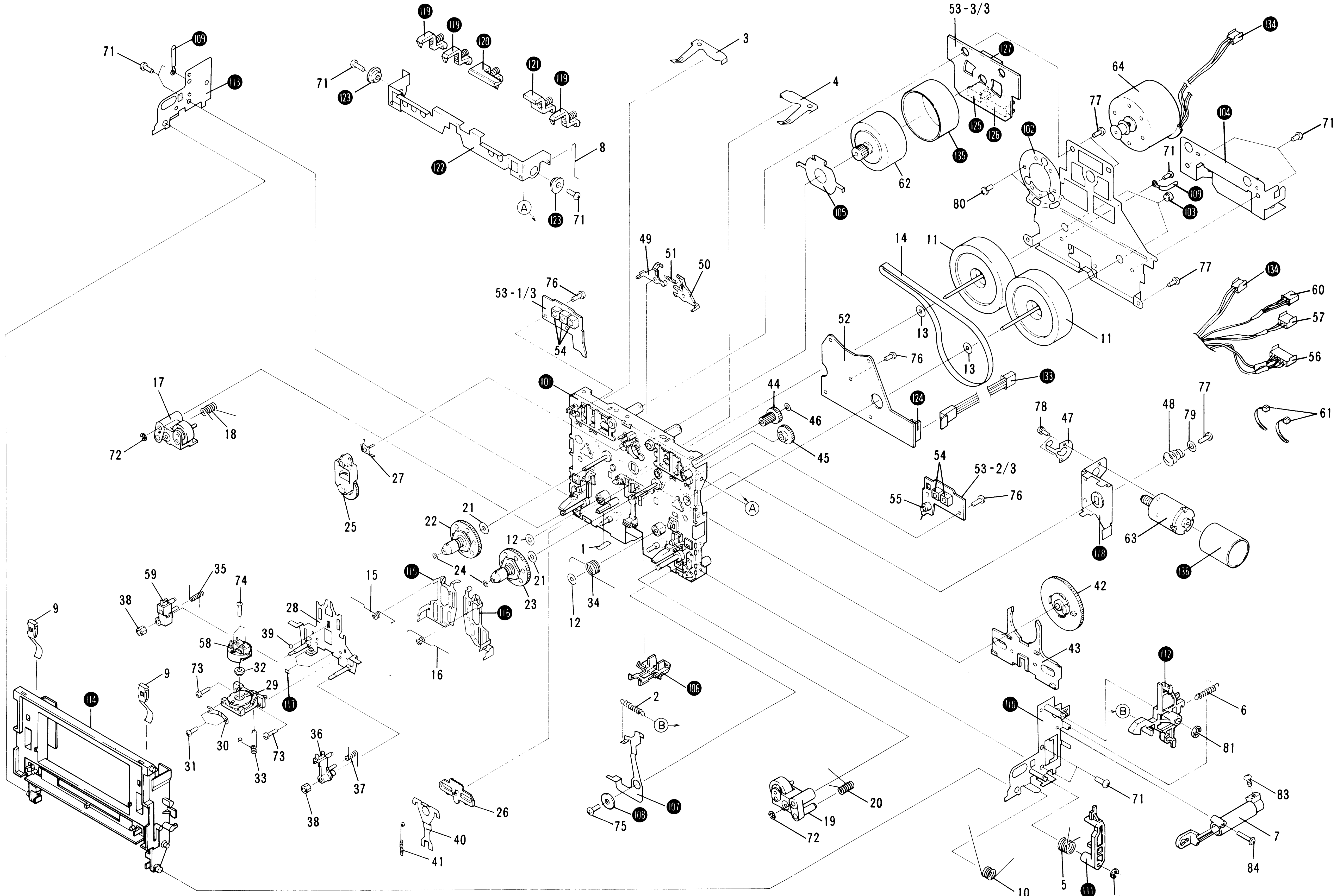
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- *Parts without part number cannot be supplied.*
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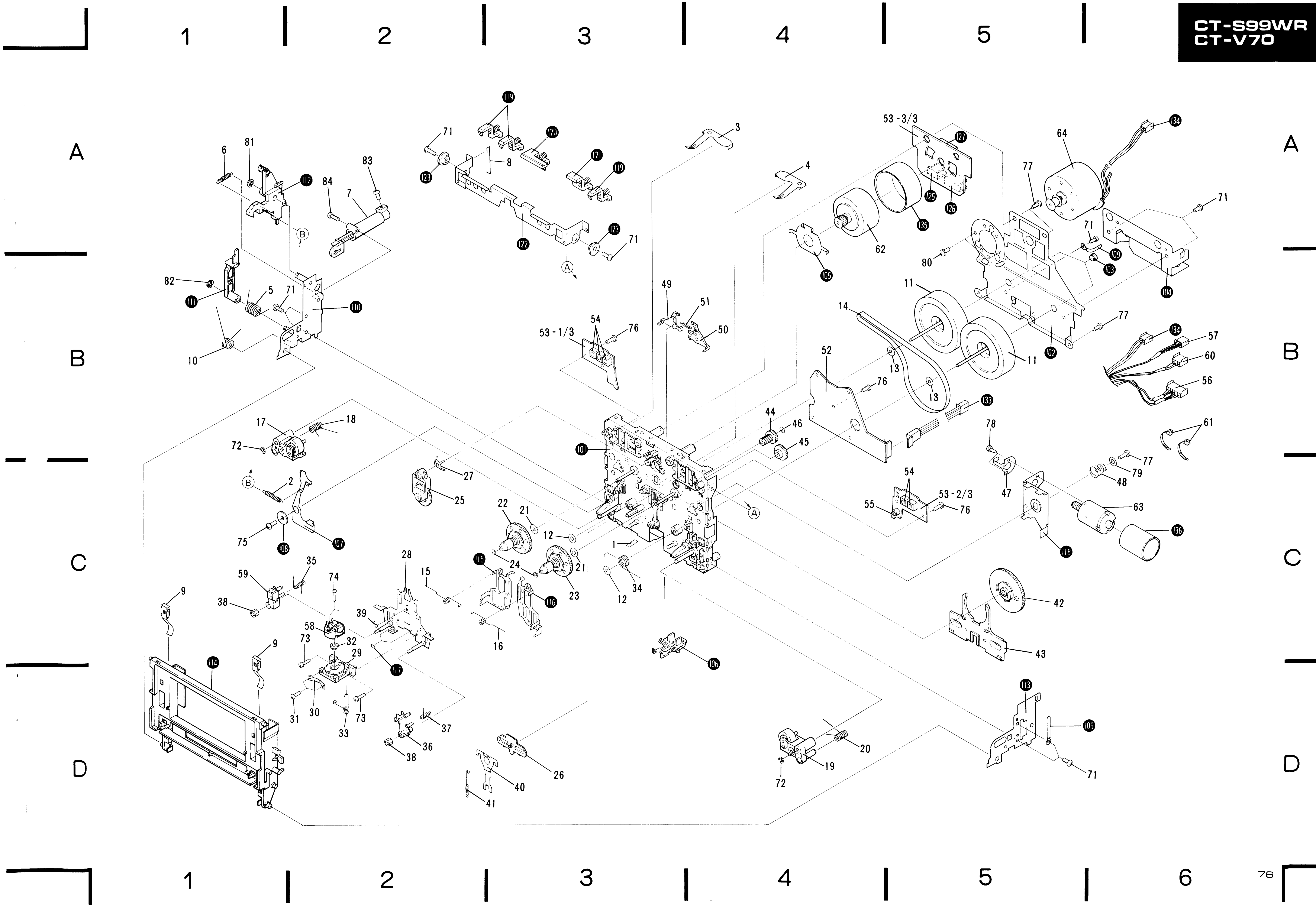
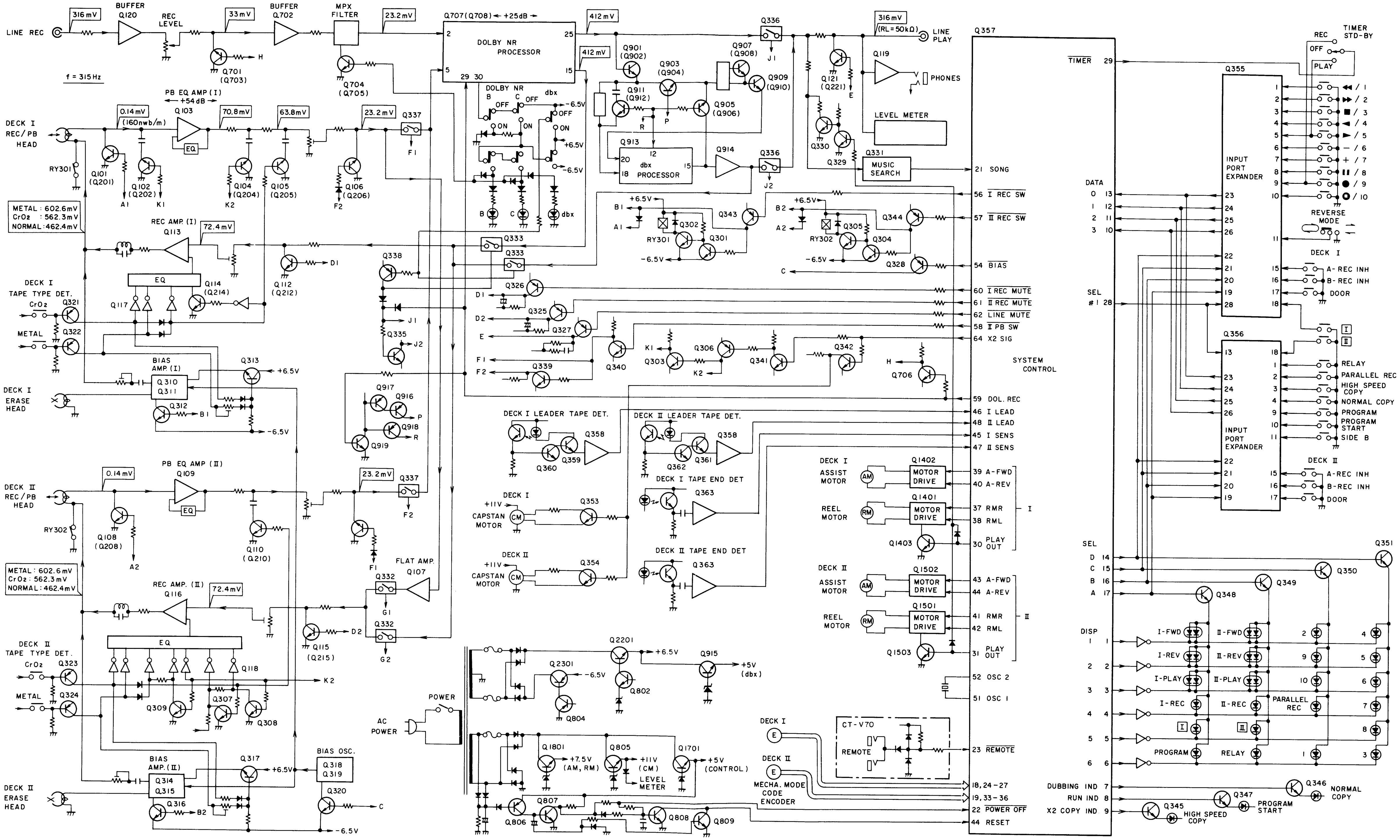
  ★★ GENERALLY MOVES FASTER THAN ★.
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

Parts List of Tape Transport Unit (Deck II)

Mark	No.	Part No.	Description
	1	REF-025	Reflection plate
	2	RBL-091	Eject prevention spring
	3	RBK-188	Hold spring (L)
	4	RBK-189	Hold spring (R)
	5	RBL-097	Stopper spring (L)
	6	RBL-077	Eject arm spring
	7	RXC-036	Damper assembly
	8	RBL-078	Rod (R)
	9	RNH-349	Hold spring
	10	RBL-126	Door spring (L)
	11	RXC-037	Flywheel assembly
	12	RBF-030	Oil stopper washer
	13	WA26D045D025	Washer
★★	14	REB-519	Capstan belt
	15	RBL-080	SB spring (L)
	16	RBL-081	SB spring (R)
★★	17	RXC-038	Pinch roller assembly (L)
	18	RBL-082	Pinch roller spring (L)
★★	19	RXC-039	Pinch roller assembly (R)
	20	RBL-083	Pinch roller spring (R)
	21	WA21D070D013	Washer
	22	RXC-040	Reel base assembly
	23	RXC-075	TU reel base assembly
	24	RBF-057	Washer
★★	25	RXC-076	Idler assembly
	26	RNL-926	C/R slide plate
	27	RBK-191	Damper spring
	28	RXC-042	Head base plate
	29	RXC-043	Head housing
	30	RBK-184	Azimuth spring
	31	RBA-092	Azimuth screw
	32	REB-521	Cushion
	33	RBL-085	Rotator spring
	34	RBL-086	HB spring
	35	RBL-087	Spring (L)
	36	RNL-929	Tape guide
	37	RBL-088	Spring (R)
	38	RNL-930	Nut
	39	REF-024	Steel ball
	40	RBK-185	Hold spring
	41	RBL-089	CR slide spring
	42	RXC-044	Gear assembly
	43	RNL-932	Switching slide plate
	44	RNM-103	Worm gear
	45	RNL-934	Idler gear
	46	RBF-057	Washer
	47	RBK-187	Thrust spring
	48	RBL-090	BKT spring
	49	RNL-936	Brake lever (L)
	50	RNL-937	Brake lever (R)
	51	RBL-092	Brake spring
	52	RNR-321	Sensor panel
	53	RNR-270	P.C. board
★★	54	RSG-162	Tact switch
★	55	NJL5141E	Photo-interrupter
	56	RKS-007	Connector (6-P)
	57	RKS-009	Connector (3-P)
★★	58	RPB-120	Tape head assembly
	59	RXC-049	Sensor assembly
	60	RKS-010	Connector (3-P)
	61	REC-371	Wire tie
★★	62	RXM-122	Reel motor assembly
★★	63	RXM-134	Assist motor assembly
★★	64	RXM-124	Capstan motor assembly
	71	PVZ30P040FMC	Screw 3 x 4
	72	YE20FUC	Washer E-type
	73	PMA20Y050FMC	Screw 2 x 5
	74	PMZ14P050FNi	Screw 1.4 x 5
	75	PVZ30P060FMC	Screw 3 x 6
	76	PRZ20P060FMC	Screw 2 x 6
	77	PRZ26P080FMC	Screw 2.6 x 8
	78	PMA20P030FZB	Screw 2 x 3
	79	WB30FMC	Washer
	80	PMA26P040FMC	Screw 2.6 x 4
	81	YE30FUC	Washer E-type
	82	YE25FUC	Washer E-type
	83	PMZ26P040FMC	Screw 2.6 x 4
	84	iCZ20P120FMC	Screw 2 x 12
	101		Chassis
	102		Motor bracket
	103		Thrust screw
	104		Hold plate
	105		Grounding plate
	106		Wire holder
	107		Eject prevention arm (L)
	108		Spacer
	109		Cord fixer
	110		Bracket assembly
	111		Stopper (L)
	112		Eject arm (L)
	113		Side plate (B)
	114		Door frame
	115		Slide base (L)
	116		Slide base (R)
	117		Spacer
	118		Assit motor bracket (R)
	119		REC detector assembly
	120		Metal detector assembly
	121		Eject detector assembly
	122		Detector arm
	123		Spacer
	124		Connector (6-P)
	125		Connector (3-P)
	126		Connector (6-P)
	127		Connector (7-P)
	128		....
	129		....
	130		....
	131		....
	132		....
	133		Connector (6-P)
	134		Connector (2-P)
	135		Shield plate
	136		Shield plate


A
B
C
D
A
53-3/3
B
53-1/3
B
53-2/3
A

11. BLOCK DIAGRAM


LINE REC
316mV
BUFFER Q120
REC LEVEL
33mV
Q701 (Q703)
BUFFER Q702
MPX FILTER
Q704 (Q705)
23.2mV
Q707(Q708) +25dB
DOLBY NR PROCESSOR
412mV
f = 315Hz
PB EQ AMP (I) +54dB
Q103
DECK I REC/PB HEAD
0.14mV (160nwb/m)
70.8mV
63.8mV
23.2mV
Q337
F1
RY301
Q101 (Q201)
Q102 (Q202)
Q104 (Q204)
Q105 (Q205)
Q106 (Q206)
METAL : 602.6mV
CrO2 : 562.3mV
NORMAL : 462.4mV
REC AMP. (I) Q113
72.4mV
EQ
Q114 (Q214)
Q112 (Q212)
Q117
DECK I TAPE TYPE DET.
CrO2 Q321
METAL Q322
BIAS AMP (I)
Q310 Q311
Q312
Q313 +6.5V
-6.5V
DECK I ERASE HEAD
DOLBY NR B C OFF dbx OFF ON
-6.5V +6.5V
Q333
Q338
Q326
Q325
Q327
Q335
Q339
J1 J2
Q917 Q916 Q918 Q919
P R
Q901 (Q902)
Q911 (Q912)
Q903 (Q904)
Q907 (Q908)
Q909 (Q910)
Q905 (Q906)
Q913 dbx PROCESSOR
Q914
Q336
Q121 (Q221)
Q119
PHONES
LINE PLAY
316mV (RL=50kΩ)
LEVEL METER
Q330 Q329
Q331 MUSIC SEARCH
+6.5V
RY301 Q302 Q301
Q343
RY302 Q305 Q304
Q344
Q328
Q340
Q303 Q306 Q341 Q342
Q706
DECK I LEADER TAPE DET.
Q358 Q359 Q360
DECK II LEADER TAPE DET.
Q358 Q361 Q362
DECK I TAPE END DET
Q363
DECK II TAPE END DET
Q363
DECK I +11V CAPSTAN MOTOR CM Q353
DECK II +11V CAPSTAN MOTOR CM Q354
DECK II REC/PB HEAD
PB EQ AMP (II) Q109
0.14mV
23.2mV
Q337 F2
RY302
Q108 (Q208)
Q110 (Q210)
FLAT AMP. Q107
Q332
G1 G2
REC AMP. (II) Q116
72.4mV
Q115 (Q215)
Q118
DECK II TAPE TYPE DET.
CrO2 Q323
METAL Q324
Q309 Q307 Q308
K2
BIAS AMP. (II)
Q314 Q315
Q316
Q317 +6.5V
BIAS OSC. Q318 Q319
Q320
DECK II ERASE HEAD
POWER
AC POWER
Q2201 +6.5V
Q915 +5V (dbx)
Q2301 -6.5V
Q802 Q804
Q1801 +7.5V (AM, RM)
Q805 +11V (CM) LEVEL METER
Q1701 +5V (CONTROL)
Q806 Q807 Q808 Q809
DECK I E
DECK II E
MECHA. MODE CODE ENCODER
CT-V70 REMOTE
Q357
SYSTEM CONTROL
TIMER 29
21 SONG
56 I REC SW
57 II REC SW
54 BIAS
60 I REC MUTE
61 II REC MUTE
62 LINE MUTE
58 II PB SW
64 X2 SIG
59 DOL. REC
46 I LEAD
48 II LEAD
45 I SENS
47 II SENS
DECK I ASSIST MOTOR AM
Q1402 MOTOR DRIVE
39 A-FWD
40 A-REV
REEL MOTOR RM
Q1401 MOTOR DRIVE
37 RMR
38 RML
Q1403
30 PLAY OUT
DECK II ASSIST MOTOR
Q1502 MOTOR DRIVE
43 A-FWD
44 A-REV
REEL MOTOR
Q1501 MOTOR DRIVE
41 RMR
42 RML
Q1503
31 PLAY OUT
52 OSC 2
51 OSC 1
23 REMOTE
18, 24-27
19, 33-36
22 POWER OFF
44 RESET
DATA 0 13 1 12 2 11 3 10
SEL #1 28
SEL D 14 C 15 B 16 A 17
DISP 1 1 2 2 3 3 4 4 5 5 6 6
DUBBING IND 7
RUN IND 8
X2 COPY IND 9
TIMER STD-BY REC OFF PLAY
Q355 INPUT PORT EXPANDER
◀◀ / 1
▶▶ / 2
■ / 3
◀ / 4
▶ / 5
− / 6
+ / 7
II / 8
● / 9
○ / 10
REVERSE MODE
DECK I A-REC INH B-REC INH DOOR
Q356 INPUT PORT EXPANDER
I II
RELAY
PARALLEL REC
HIGH SPEED COPY
NORMAL COPY
PROGRAM
PROGRAM START
SIDE B
DECK II A-REC INH B-REC INH DOOR
Q351 Q350 Q349 Q348
I-FWD II-FWD
I-REV II-REV
I-PLAY II-PLAY
I-REC II-REC
PARALLEL REC
PROGRAM RELAY
Q346 NORMAL COPY
Q347 PROGRAM START
Q345 HIGH SPEED COPY

12. CIRCUIT DESCRIPTIONS

12.1 OUTLINE OF MAIN SECTIONS

Playback Equalizer

A low-noise operation amplifier IC (M5220L) is used for both deck I and II.

Dolby NR Section

This section features a Dolby NR B/C IC (HA12058NT). When in copy mode, however, the deck I playback signal is recorded directly in deck II without passing through the Dolby NR section.

dbx System

The "dbx system" is a decilinear noise reduction system developed by the dbx Incorporated of America. In this system, audio signals are subject to accurate logarithmic compression and expansion over a very wide level range and with little distortion.

The dbx system consists of an encoder and a decoder. Input signals are compressed to 1/2 the decibel level by the dbx encoder and are recorded on tape in accordance with the recording characteristics shown in Figure 12-1-2 with the dynamic range reduced by half. The tape deck playback output signal (compressed signal) is passed to the decoder where the constantly changing level is expanded to twice the decibel level in accordance with the playback characteristics shown in Figure 12-1-2. - 30dB signals are expanded to - 60dB, and the noise level, too, is reduced by 30dB in what is effectively a noise reduction system. And +10dB playback outputs are expanded to +20dB, thereby improving the tape saturation characteristics by 10dB by the so-called increased saturation level effect. The end result is an effective expansion of the dynamic range. And since these compression and expansion operations are linear logarithmic changes, there is little chance of misoperations occurring. For example, failure to match the recording and playback levels does not result in deterioration of the overall frequency response.

*** dbx System configuration**

The major components of the dbx system are the encoder (route amplifier) where the dynamic range of input signals is compressed by 1/2, and a decoder (square-law amplifier) where signals are expanded by the factor of 2. (See Figure 12-1-1.)

VCA: The VCA (Voltage controlled Amplifier) is one of the most important component circuits in the dbx system. VCA amplification can be changed linearly by external DC control currents (that is, doubling the control current doubles the amplification in decibel terms). The dynamic range of input signals can thus be compressed and expanded.

RMS level sensor: The next most important dbx system circuit is the RMS level sensor which generates a DC voltage proportional to the size of the input signal. The RMS sensor detects the root mean square value of the input signal and converts it to a DC voltage proportional to the logarithm of the detected level.

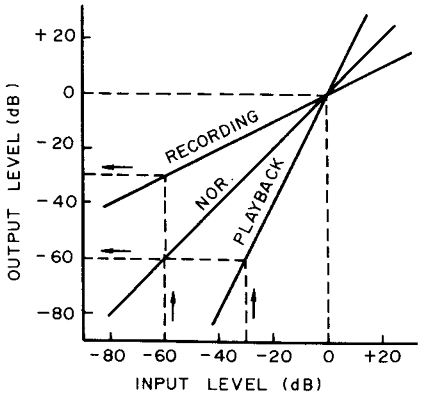


Fig. 12-1-2 Level voltage and expansion

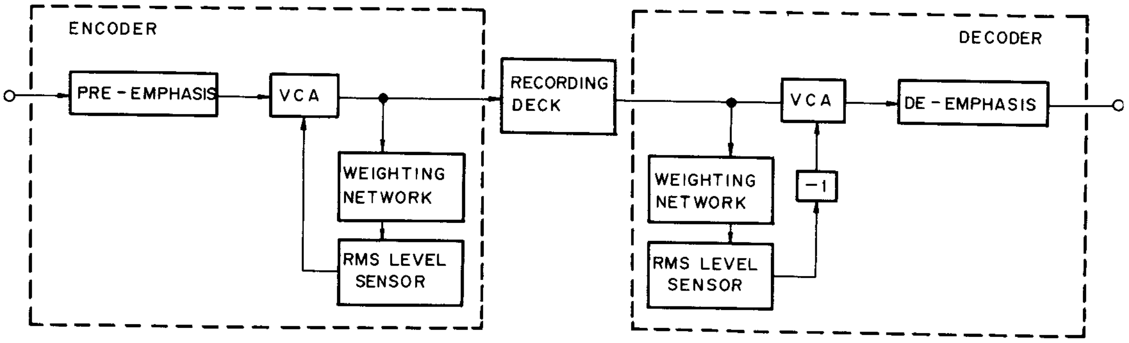


Fig. 12-1-1 dbx System bloc diagram

Emphasis: Since high frequencies in the input signal are boosted by pre-emphasis, and returned to the original level by de-emphasis during playback, the high end noise is reduced by some 10dB in addition to the intrinsic noise reduction effect achieved by compression and expansion. This emphasis action is also effective in reducing harmonic distortion generated during recording and in improving the hiss envelope tracing.

Weighting network: If signals where the high frequencies have been boosted by pre-emphasis in the encoder are recorded directly onto tape, the tape's high end saturation point may be exceeded resulting in generation of distortion. To avoid this, the VCA amplification must be reduced by an appropriate degree for signals containing a relatively high proportion of high frequency components. This is achieved by inserting weighting networks before and after the RMS level sensor to increase the sensitivity of the level sensor for signals with a large high frequency content, thereby lowering the VCA amplification.

*** dbx System operation**

The input signal is passed to the VCA via a pre-emphasis stage. Part of the VCA output is passed to the RMS level sensor via a weighting network, resulting in the generation of a DC voltage at the RMS level sensor output in proportion to the size of the input signal. The VCA amplification is varied according to the size of this DC voltage, and the dynamic range of the input signal is reduced by 1/2 in terms of decibel level before

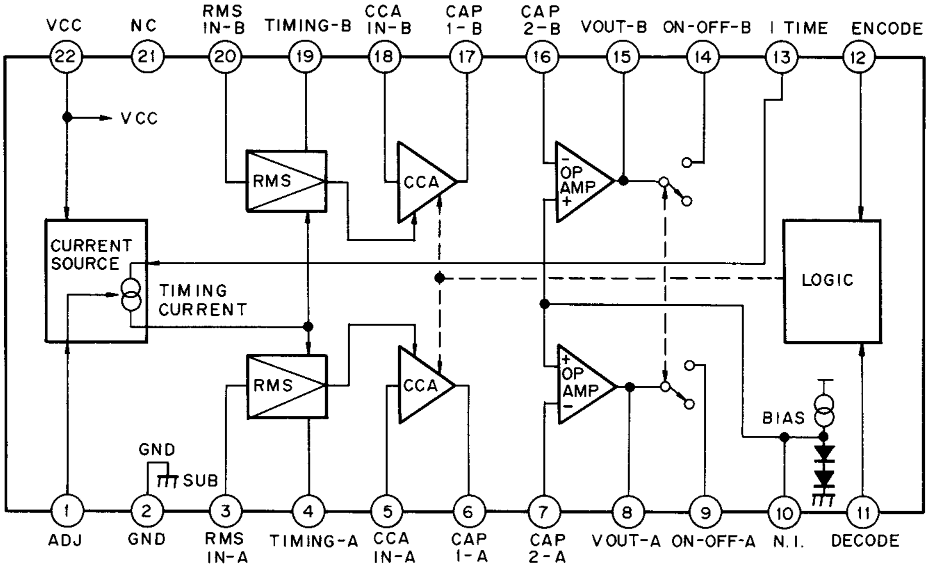


Fig. 12-1-3 AN6291 Block diagram

Pin No.	Pin name	Description	Pin No.	Pin name	Description
1	ADJ	Timing current adjustment pin	12	ENCODE	Encode/decode selector switch (encode)
2	GND	Ground	13	I TIME	Timing current circuit power
3	RMS IN-A	Channel A RMS circuit input	14	ON-OFF-B	Channel B electronic switch
4	TIMING-A	Channel A timing capacitor pin	15	VOUT-B	Channel B output
5	CCA IN-A	Channel A CCA circuit input	16	CAP-2-B	Channel B output circuit input
6	CAP-1-A	Channel A CCA circuit output	17	CAP-1-B	Channel B CCA circuit output
7	CAP-2-A	Channel A output circuit input	18	CCA-IN-B	Channel B CCA circuit input
8	VOUT-A	Chanel A output	19	TIMING-B	Channel B timing capacitor pin
9	ON-OFF-A	Channel A electronic switch	20	RMS IN-B	Channel B RMS circuit input
10	N.I.	Bias circuit decoupling	21	NC	Internal connection pin
11	DECODE	Encode/decode selector switch (decode)	22	Vcc	Power supply

Fig. 12-1-4 AN6291 Pin description

being passed to the recording deck.

The playback signal is passed to the decoder with part of the signal being passed via a weighting network to the RMS level sensor. The sensor output becomes a DC voltage with the opposite sign to the encoder, and this is used to control the VCA. The input signal dynamic range is expanded to twice the decibel level before being passed to the output via the de-emphasis stage.

*** The CT-S99WR dbx system**

The dbx system featured in the CT-S99WR is incorporated in an IC (AN6291) containing dbx circuits for two channels. Although the VCA in AN6291 is a CCA (Current Controlled Amplifier) type of variable gain amplifier, it is basically the same as the VCA. This type of dbx system, therefore, is called the type II system. The main difference between the type I and type II systems is the larger weighting network time constant in type II, resulting in a higher sensitivity to high frequency components. As a result, the encoder amplification is lower at higher frequencies, thereby enabling the system to operate more effectively in respect to the saturation point of the cassette tape.

Recording Amplifier

An operational amplifier IC (M5218L) is used in both deck I and deck II. Adjustments to handle different tapes are made by switching peaking elements in the feedback circuit.

Recording Bias Stage

Decks I and II are equipped with separate bias amplifiers based on a single push-pull oscillator. Therefore, bias ON/OFF and bias level are switched independently.

System Control

System control is based on the PD3031A (64-pin) microcomputer which controls tape transport and signal routes, and two LC7800 input port expansion ICs. Tape transport mode switching is performed by an assist motor, and the operational status is fed back to the microcomputer in digital code form.

Motor Drive Stage

Assist motor and reel motor operations are controlled by the motor drive IC (BA6109) for both deck I and II, this IC being controlled by PD3031A.

Blank Tape Section Detector

The audio level sensor IC (BA335) generates an H level output (an open collector output requiring a pull-up resistance) while an audio input signal (cue or review playback signal) is applied to the IC. When the input signal stops, the IC output is changed to an L level signal. This output is passed to PD3031A where the "blank tape section between tunes" is identified.

Leader Tape Detector

Leader tape is detected by an optical system (LED and photo-transistor) where the difference in optical permeability in the leader tape and magnetic coated tape is detected. The detected signals are judged by a DC level comparator, and the result then passed to the microcomputer.

Tape End Detector

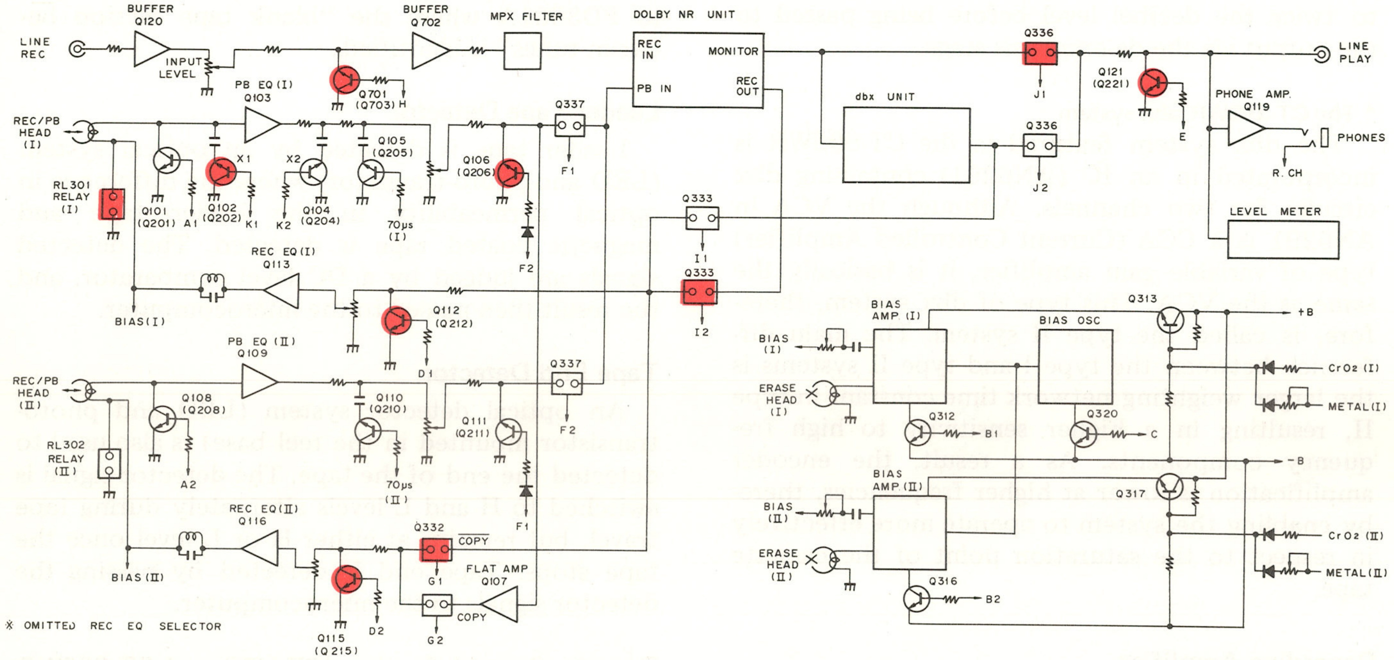
An optical detector system (LED and photo-transistor mounted in the reel base) is also used to detected the end of the tape. The detector signal is switched to H and L levels alternately during tape travel, but remains at either H or L level once the tape stops. Tape end is detected by passing the detector signals to the microcomputer.

Remote Control Section (CT-V70 and CT-S99WR [BK]/D/G only)

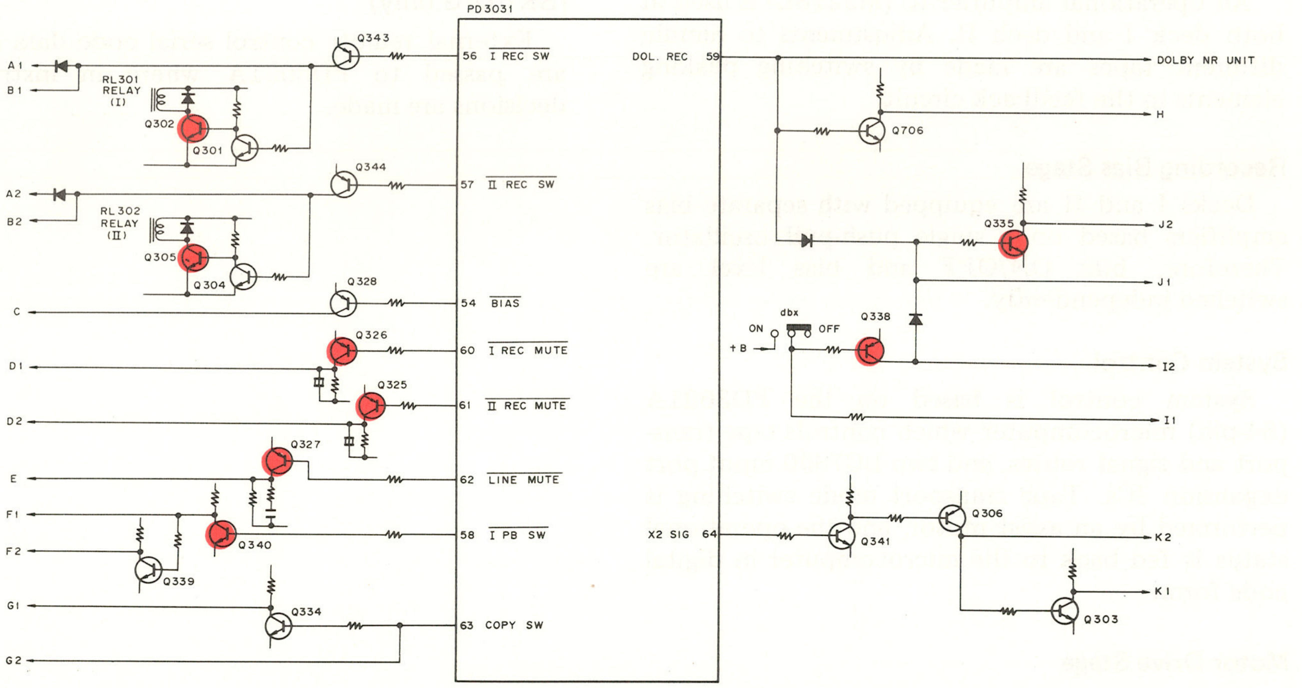
External remote control serial code data signals are passed to PD3031A where in instruction decisions are made.

12.2 SIGNAL ROUTE

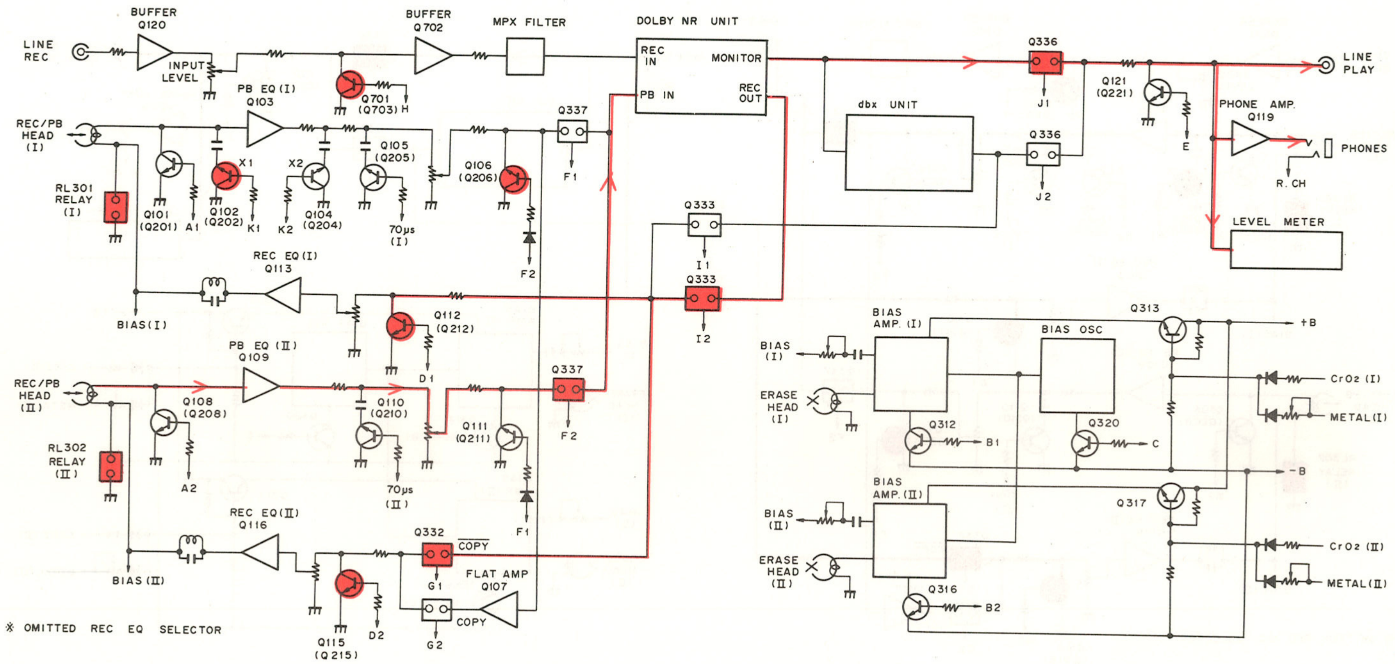
Deck I : STOP
Deck II : STOP


LINE REC
BUFFER Q120
INPUT LEVEL
BUFFER Q702
MPX FILTER
DOLBY NR UNIT
REC IN
MONITOR
PB IN
REC OUT
Q336
J1
Q121 (Q221)
E
LINE PLAY
PHONE AMP. Q119
PHONES
R. CH
dbx UNIT
Q336
J2
LEVEL METER
PB EQ (I) Q103
Q701 (Q703) H
Q337
F1
REC/PB HEAD (I)
RL301 RELAY (I)
Q101 (Q201)
A1
X1
Q102 (Q202)
K1
X2
K2
Q104 (Q204)
Q105 (Q205)
70μs (I)
Q106 (Q206)
F2
Q333
I1
Q333
I2
REC EQ (I) Q113
BIAS (I)
Q112 (Q212)
PB EQ (II) Q109
D1
Q337
REC/PB HEAD (II)
Q108 (Q208)
RL302 RELAY (II)
A2
Q110 (Q210)
Q111 (Q211)
F2
70μs (II)
F1
REC EQ (II) Q116
BIAS (II)
Q332
COPY
G1
FLAT AMP Q107
COPY
G2
D2
Q115 (Q215)
BIAS AMP (I)
BIAS OSC
Q313
+B
BIAS (I)
ERASE HEAD (I)
Q312
B1
Q320
C
CrO2 (I)
METAL (I)
-B
BIAS AMP (II)
Q317
BIAS (II)
ERASE HEAD (II)
Q316
B2
CrO2 (II)
METAL (II)

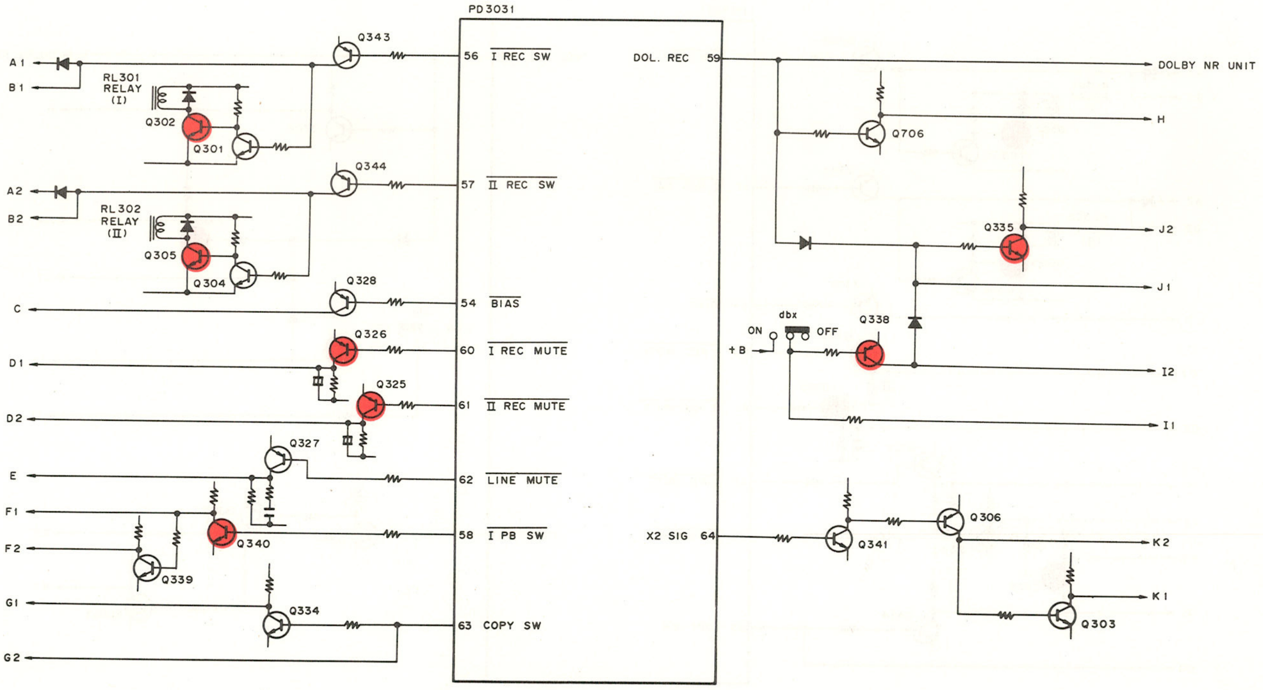
※ OMITTED REC EQ SELECTOR


PD3031
A1
B1
Q343
56 I REC SW
RL301 RELAY (I)
Q302
Q301
A2
B2
Q344
57 II REC SW
RL302 RELAY (II)
Q305
Q304
C
Q328
54 BIAS
D1
Q326
60 I REC MUTE
D2
Q325
61 II REC MUTE
E
Q327
62 LINE MUTE
F1
F2
Q340
58 I PB SW
Q339
G1
Q334
63 COPY SW
G2
DOL. REC 59
DOLBY NR UNIT
Q706
H
Q335
J2
J1
dbx
ON
OFF
+B
Q338
I2
I1
X2 SIG 64
Q341
Q306
K2
K1
Q303

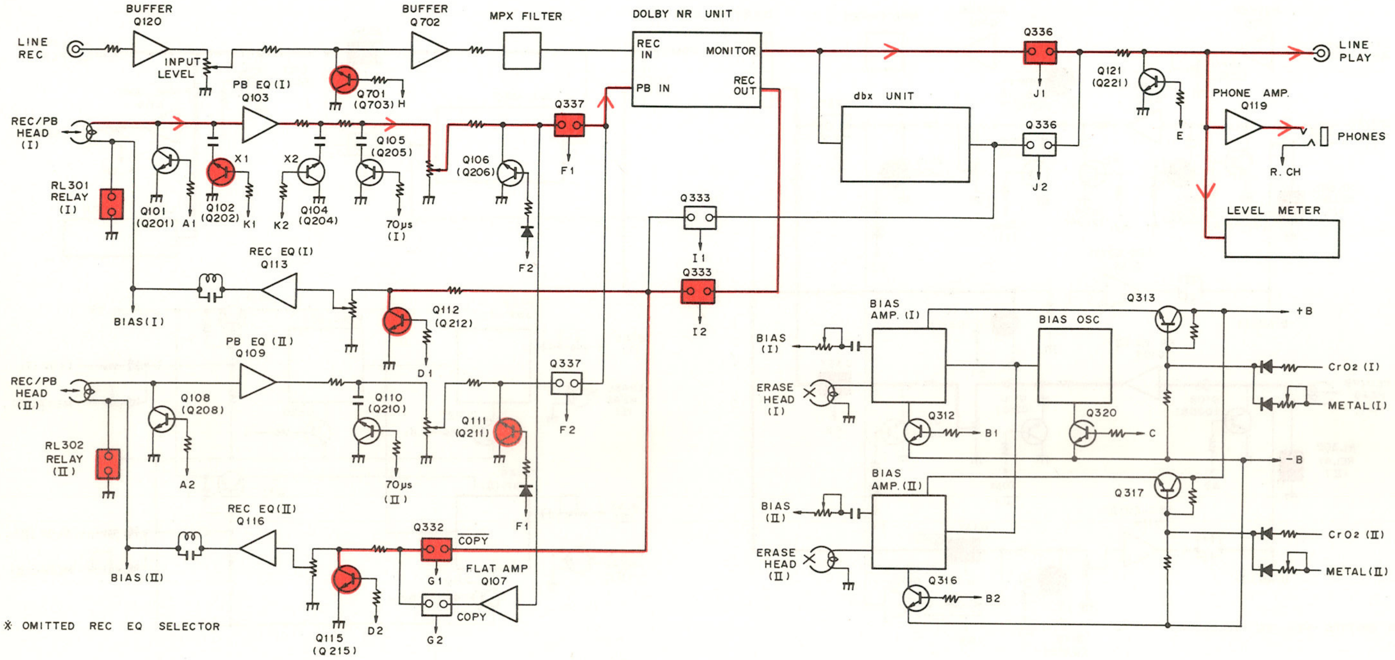
Deck I : STOP
Deck II : PLAY


LINE REC
BUFFER Q120
INPUT LEVEL
BUFFER Q702
MPX FILTER
DOLBY NR UNIT
REC IN
MONITOR
PB IN
REC OUT
Q336
J1
LINE PLAY
Q121 (Q221)
PHONE AMP. Q119
PHONES
R. CH
E
dbx UNIT
Q336
J2
LEVEL METER
PB EQ (I) Q103
Q701 (Q703) H
REC/PB HEAD (I)
RL301 RELAY (I)
X1
X2
Q105 (Q205)
Q106 (Q206)
Q337
F1
Q101 (Q201)
A1
Q102 (Q202)
K1
K2
Q104 (Q204)
70μs (I)
F2
Q333
I1
Q333
I2
REC EQ (I) Q113
BIAS(I)
Q112 (Q212)
D1
PB EQ (II) Q109
REC/PB HEAD (II)
Q108 (Q208)
RL302 RELAY (II)
Q110 (Q210)
Q111 (Q211)
Q337
F2
A2
70μs (II)
F1
REC EQ(II) Q116
BIAS (II)
Q332
COPY
FLAT AMP Q107
G1
COPY
Q115 (Q215)
D2
G2
BIAS AMP. (I)
BIAS OSC
Q313
+B
BIAS (I)
ERASE HEAD (I)
CrO2 (I)
METAL(I)
Q312
B1
Q320
C
-B
BIAS AMP. (II)
Q317
BIAS (II)
ERASE HEAD (II)
CrO2 (II)
METAL(II)
Q316
B2

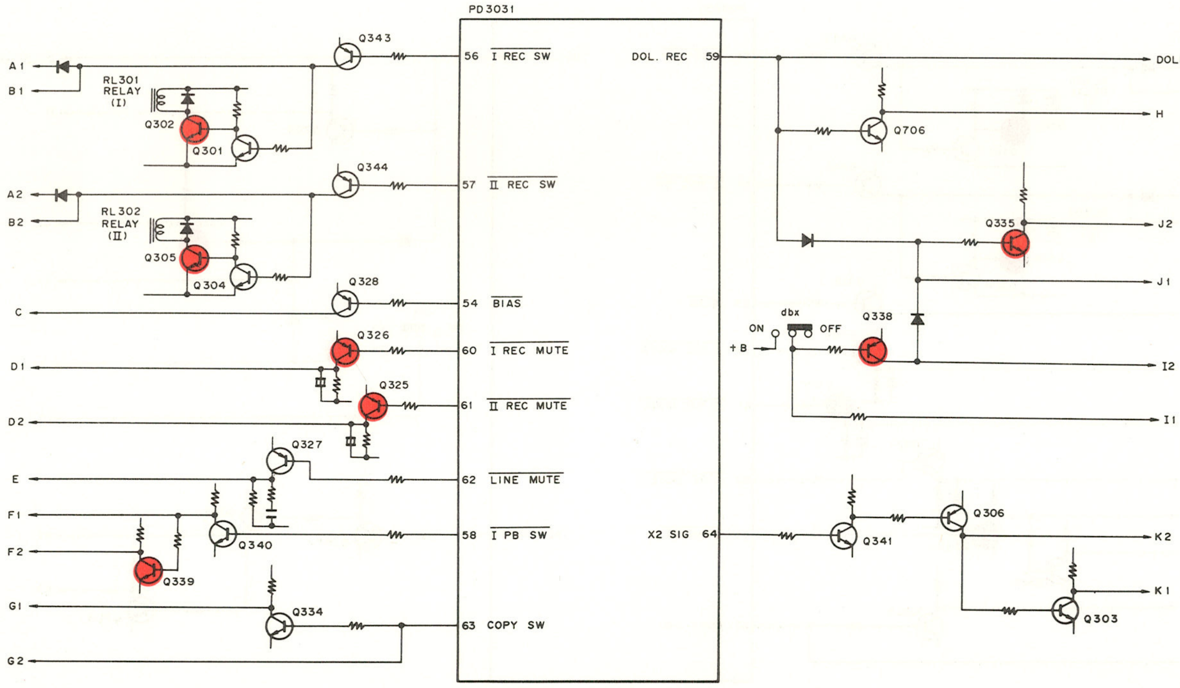
※ OMITTED REC EQ SELECTOR


PD3031
A1
B1
Q343
56 I REC SW
DOL. REC 59
DOLBY NR UNIT
RL301 RELAY (I)
Q302
Q301
H
Q706
Q344
A2
57 II REC SW
B2
RL302 RELAY (II)
Q305
Q304
Q335
J2
Q328
C
54 BIAS
J1
dbx
ON
OFF
Q338
+B
Q326
D1
60 I REC MUTE
I2
Q325
D2
61 II REC MUTE
I1
Q327
E
62 LINE MUTE
F1
F2
Q340
58 I PB SW
X2 SIG 64
Q341
Q306
K2
Q339
G1
Q334
K1
Q303
G2
63 COPY SW

Deck I : PLAY
Deck II : STOP

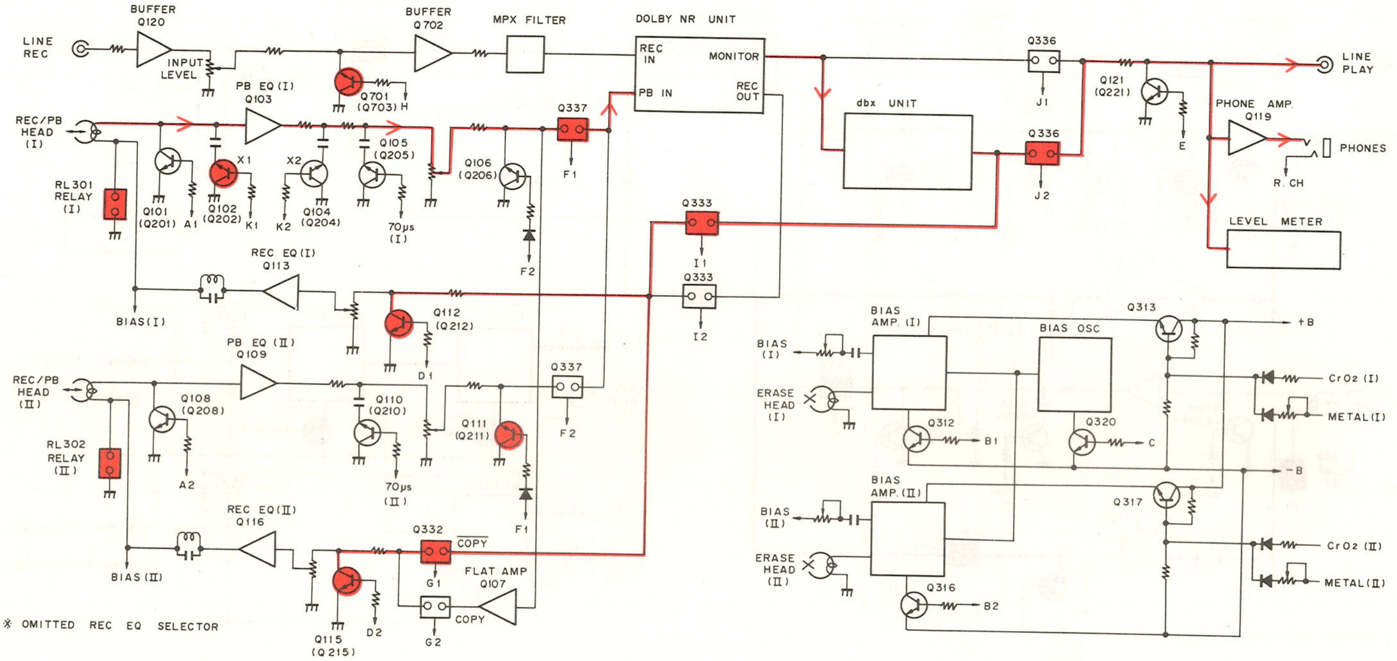

LINE REC
BUFFER Q120
INPUT LEVEL
BUFFER Q702
MPX FILTER
DOLBY NR UNIT
REC IN
MONITOR
PB IN
REC OUT
Q336
J1
Q121 (Q221)
LINE PLAY
PHONE AMP. Q119
PHONES
R. CH
E
dbx UNIT
Q336
J2
LEVEL METER
Q701 (Q703) H
PB EQ (I) Q103
REC/PB HEAD (I)
Q337
F1
Q105 (Q205)
Q106 (Q206)
X1
X2
RL301 RELAY (I)
Q101 (Q201)
A1
Q102 (Q202)
K1
K2
Q104 (Q204)
70μs (I)
F2
Q333
I1
Q333
I2
REC EQ (I) Q113
BIAS (I)
Q112 (Q212)
D1
PB EQ (II) Q109
REC/PB HEAD (II)
Q108 (Q208)
Q110 (Q210)
Q337
F2
Q111 (Q211)
RL302 RELAY (II)
A2
70μs (II)
F1
REC EQ (II) Q116
Q332
COPY
G1
FLAT AMP Q107
BIAS (II)
Q115 (Q215)
D2
COPY
G2
BIAS AMP. (I)
BIAS OSC
Q313
+B
BIAS (I)
ERASE HEAD (I)
CrO2 (I)
METAL (I)
Q312
B1
Q320
C
-B
BIAS AMP. (II)
Q317
BIAS (II)
ERASE HEAD (II)
CrO2 (II)
METAL (II)
Q316
B2

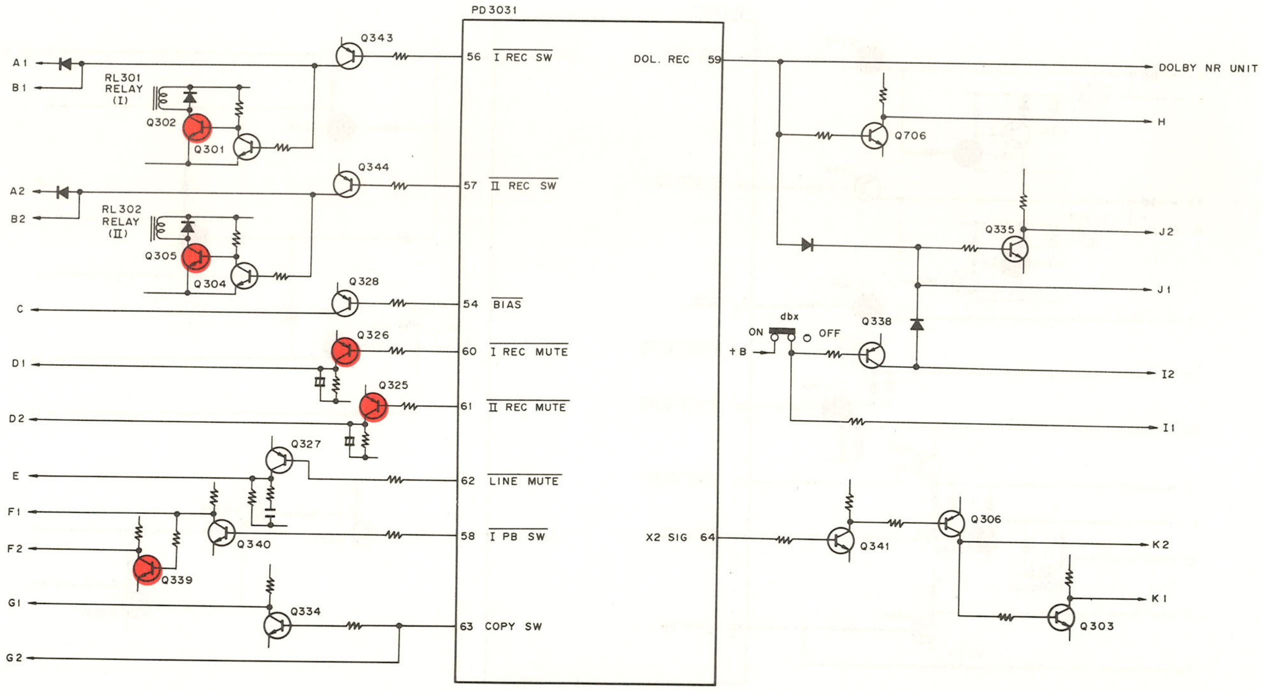
※ OMITTED REC EQ SELECTOR


PD3031
Q343
56 I REC SW
DOL. REC 59
DOLBY NR UNIT
A1
B1
RL301 RELAY (I)
Q302
Q301
H
Q706
Q344
57 II REC SW
A2
B2
RL302 RELAY (II)
Q305
Q304
Q335
J2
J1
Q328
54 BIAS
C
dbx
ON
OFF
Q338
+B
Q326
60 I REC MUTE
I2
D1
Q325
61 II REC MUTE
I1
D2
Q327
E
62 LINE MUTE
F1
Q340
58 I PB SW
X2 SIG 64
Q306
F2
Q341
K2
Q339
K1
G1
Q334
63 COPY SW
Q303
G2

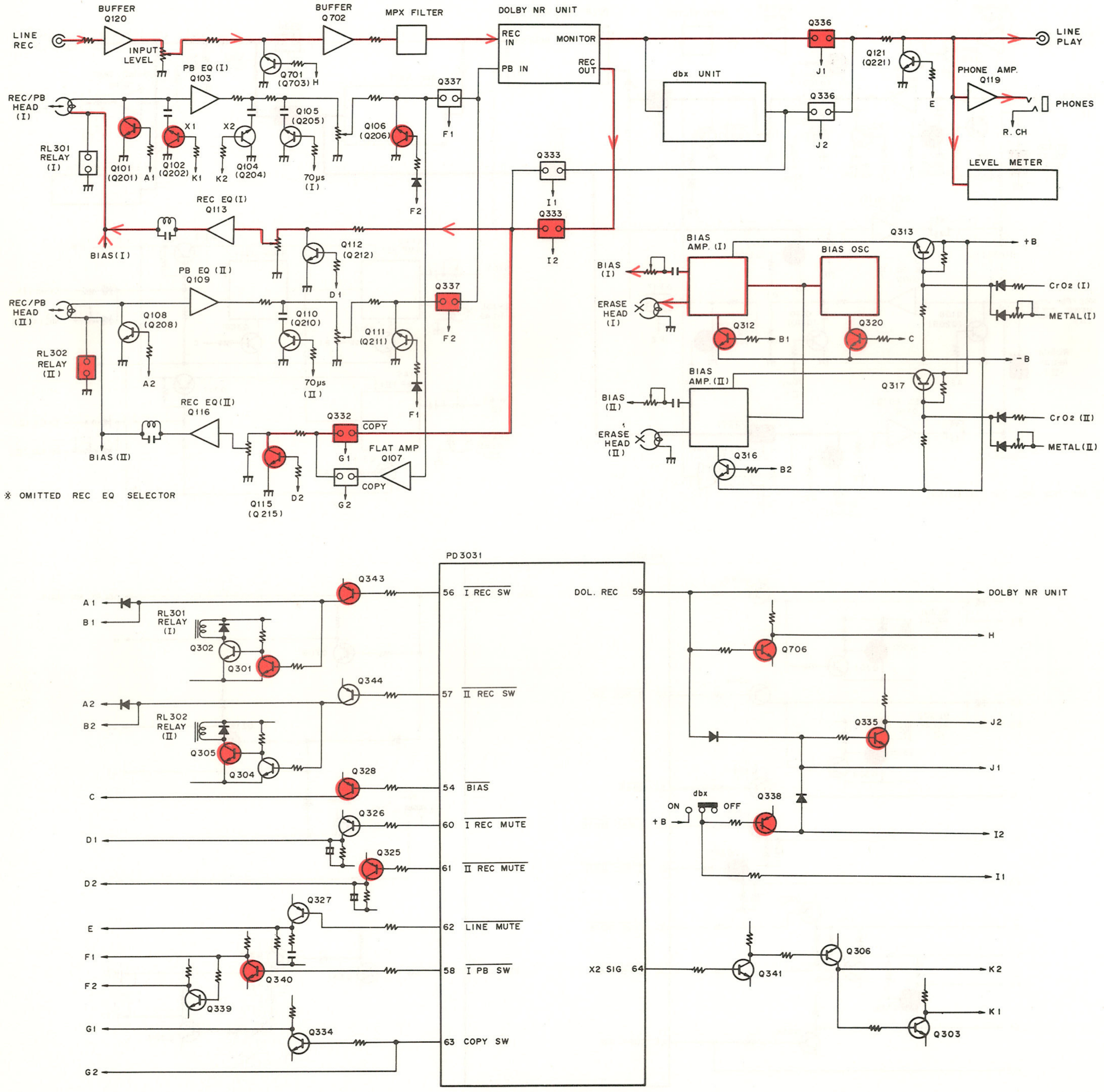
- **dbx : ON**

Deck I : PLAY
Deck II : STOP


BUFFER Q120
LINE REC
INPUT LEVEL
BUFFER Q702
MPX FILTER
DOLBY NR UNIT
REC IN
MONITOR
PB IN
REC OUT
Q336
LINE PLAY
Q701 (Q703) H
PB EQ (I) Q103
REC/PB HEAD (I)
Q337
F1
dbx UNIT
J1
Q121 (Q221)
E
PHONE AMP. Q119
PHONES
R. CH
Q336
J2
X1
X2
Q105 (Q205)
Q106 (Q206)
RL301 RELAY (I)
Q101 (Q201)
A1
Q102 (Q202)
K1
K2
Q104 (Q204)
70μs (I)
Q333
LEVEL METER
F2
REC EQ (I) Q113
I1
Q333
BIAS (I)
Q112 (Q212)
I2
BIAS AMP. (I)
Q313
+B
BIAS OSC
BIAS (I)
PB EQ (II) Q109
D1
ERASE HEAD (I)
CrO2 (I)
REC/PB HEAD (II)
Q108 (Q208)
Q110 (Q210)
Q337
METAL (I)
Q111 (Q211)
F2
Q312
B1
Q320
C
RL302 RELAY (II)
A2
70μs (II)
-B
BIAS AMP. (II)
Q317
BIAS (II)
F1
REC EQ (II) Q116
Q332
COPY
FLAT AMP Q107
ERASE HEAD (II)
CrO2 (II)
BIAS (II)
G1
METAL (II)
Q316
B2
COPY
※ OMITTED REC EQ SELECTOR
Q115 (Q215)
D2
G2

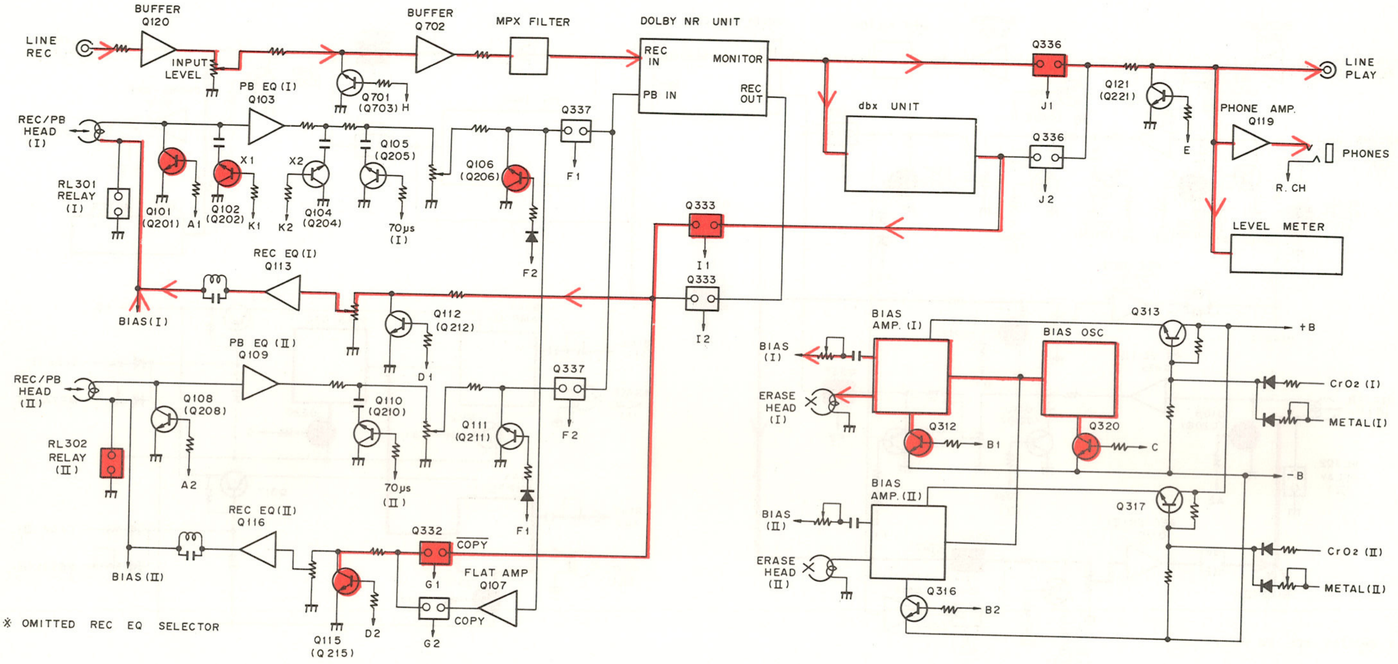

PD3031
Q343
56 I REC SW
DOL. REC 59
DOLBY NR UNIT
A1
B1
RL301 RELAY (I)
Q706
H
Q302
Q301
Q344
57 II REC SW
A2
B2
RL302 RELAY (II)
Q335
J2
Q305
Q304
Q328
J1
C
54 BIAS
dbx
ON
OFF
Q338
Q326
+B
60 I REC MUTE
D1
I2
Q325
61 II REC MUTE
D2
I1
Q327
E
62 LINE MUTE
F1
Q306
58 I PB SW
X2 SIG 64
F2
Q340
Q341
K2
Q339
K1
G1
Q334
63 COPY SW
Q303
G2

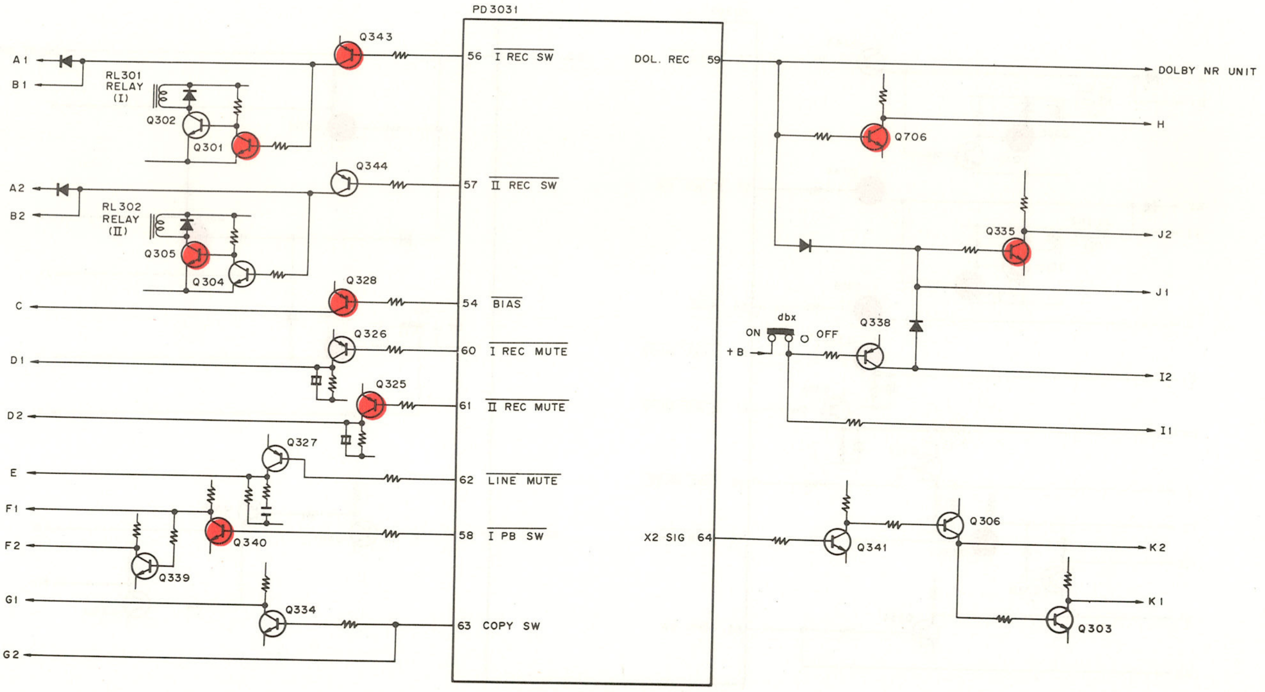
Deck I : REC
Deck II : STOP


LINE REC
BUFFER Q120
INPUT LEVEL
BUFFER Q702
MPX FILTER
DOLBY NR UNIT
REC IN
MONITOR
PB IN
REC OUT
Q336
LINE PLAY
Q121 (Q221)
J1
E
PHONE AMP. Q119
PHONES
R. CH
dbx UNIT
Q336
J2
LEVEL METER
REC/PB HEAD (I)
RL301 RELAY (I)
PB EQ (I) Q103
Q701 (Q703) H
Q101 (Q201) A1
Q102 (Q202)
X1
X2
K1
K2
Q104 (Q204)
Q105 (Q205)
70μs (I)
Q106 (Q206)
Q337
F1
F2
Q333
I1
Q333
I2
REC EQ (I) Q113
BIAS (I)
Q112 (Q212)
D1
PB EQ (II) Q109
REC/PB HEAD (II)
RL302 RELAY (II)
Q108 (Q208)
A2
Q110 (Q210)
70μs (II)
Q111 (Q211)
Q337
F2
F1
REC EQ (II) Q116
BIAS (II)
Q332
COPY
FLAT AMP Q107
G1
COPY
G2
D2
Q115 (Q215)
※ OMITTED REC EQ SELECTOR
BIAS AMP. (I)
BIAS OSC
Q313
+B
BIAS (I)
ERASE HEAD (I)
Q312
B1
Q320
C
CrO2 (I)
METAL (I)
-B
BIAS AMP. (II)
Q317
BIAS (II)
ERASE HEAD (II)
Q316
B2
CrO2 (II)
METAL (II)
PD3031
A1
B1
RL301 RELAY (I)
Q343
Q302
Q301
56 I REC SW
DOL. REC 59
DOLBY NR UNIT
H
Q706
A2
B2
RL302 RELAY (II)
Q344
Q305
Q304
57 II REC SW
Q335
J2
J1
C
Q328
54 BIAS
dbx
ON
OFF
+B
Q338
I2
D1
Q326
60 I REC MUTE
D2
Q325
61 II REC MUTE
I1
E
Q327
62 LINE MUTE
F1
F2
Q340
Q339
58 I PB SW
X2 SIG 64
Q341
Q306
K2
K1
Q303
G1
Q334
63 COPY SW
G2

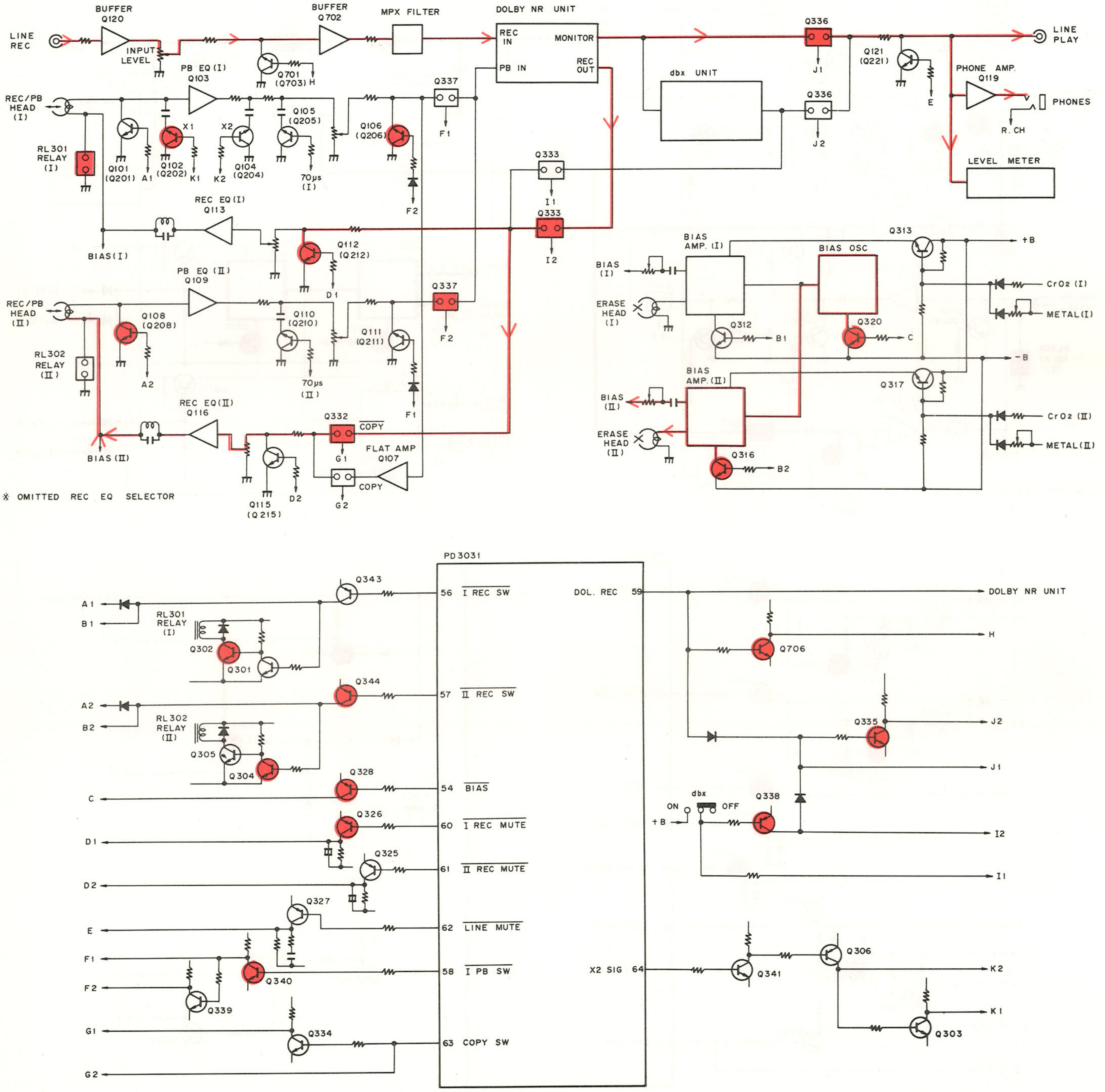
- dbx : ON

Deck I : REC
Deck II : STOP


LINE REC
BUFFER Q120
INPUT LEVEL
BUFFER Q702
MPX FILTER
DOLBY NR UNIT
REC IN
MONITOR
PB IN
REC OUT
Q336
LINE PLAY
PB EQ (I) Q103
Q701 (Q703) H
REC/PB HEAD (I)
Q337
F1
Q105 (Q205)
Q106 (Q206)
X1
X2
Q101 (Q201)
A1
Q102 (Q202)
K1
K2
Q104 (Q204)
70μs (I)
RL301 RELAY (I)
F2
dbx UNIT
J1
J2
Q121 (Q221)
PHONE AMP. Q119
E
PHONES
R. CH
LEVEL METER
Q333
I1
I2
REC EQ (I) Q113
BIAS (I)
Q112 (Q212)
D1
PB EQ (II) Q109
REC/PB HEAD (II)
Q108 (Q208)
Q110 (Q210)
Q111 (Q211)
70μs (II)
RL302 RELAY (II)
A2
REC EQ (II) Q116
BIAS (II)
Q332
COPY
G1
FLAT AMP Q107
G2
D2
Q115 (Q215)
※ OMITTED REC EQ SELECTOR
BIAS AMP. (I)
BIAS OSC
Q313
+B
BIAS (I)
ERASE HEAD (I)
Q312
B1
Q320
C
CrO2 (I)
METAL (I)
-B
BIAS AMP. (II)
Q317
BIAS (II)
ERASE HEAD (II)
Q316
B2
CrO2 (II)
METAL (II)


PD3031
A1
B1
RL301 RELAY (I)
Q343
Q302
Q301
56 I REC SW
DOL. REC 59
DOLBY NR UNIT
H
Q706
Q344
A2
B2
RL302 RELAY (II)
Q305
Q304
57 II REC SW
Q335
J2
J1
Q328
C
54 BIAS
dbx
ON
OFF
+B
Q338
I2
Q326
D1
60 I REC MUTE
Q325
D2
61 II REC MUTE
I1
Q327
E
62 LINE MUTE
F1
F2
Q340
58 I PB SW
X2 SIG 64
Q341
Q306
K2
Q339
K1
Q303
G1
Q334
63 COPY SW
G2

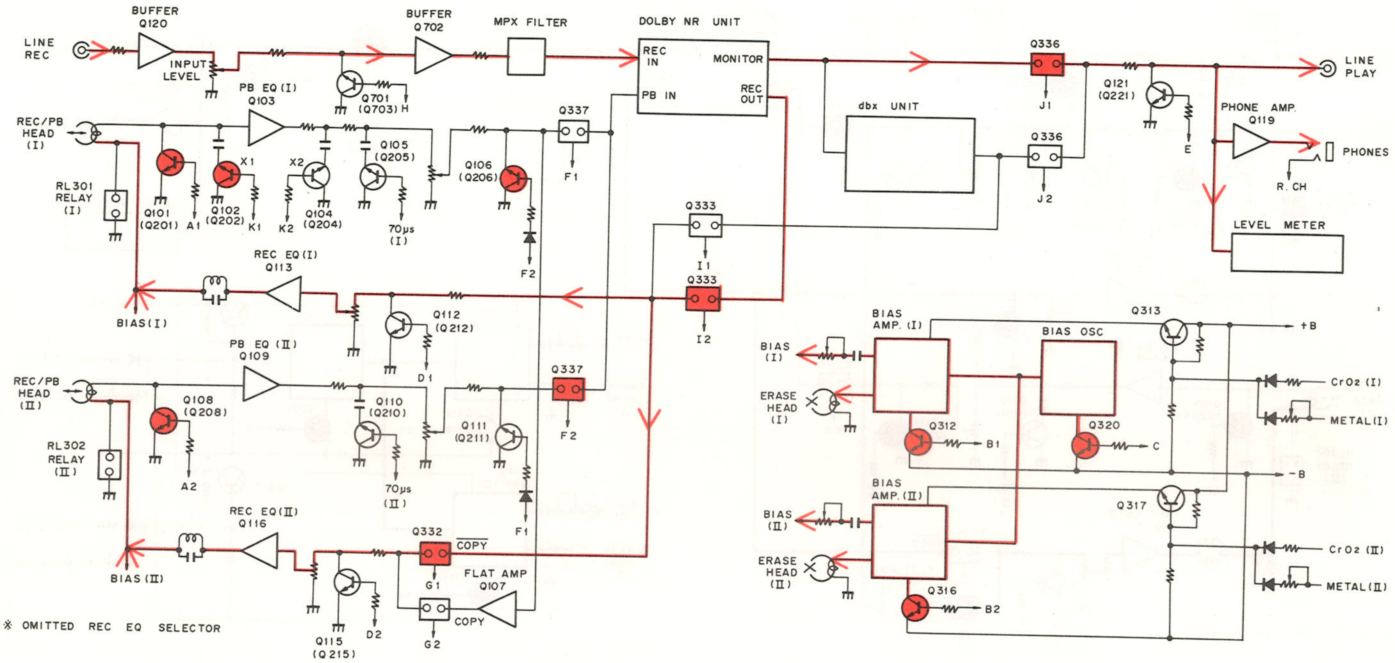
Deck I : STOP
Deck II : REC


LINE REC
BUFFER Q120
INPUT LEVEL
BUFFER Q702
MPX FILTER
DOLBY NR UNIT
REC IN
MONITOR
PB IN
REC OUT
Q336
LINE PLAY
Q121 (Q221)
PHONE AMP. Q119
PHONES
R. CH
LEVEL METER
dbx UNIT
Q336
J1
J2
E
PB EQ (I) Q103
Q701 (Q703) H
Q337
F1
REC/PB HEAD (I)
X1
X2
Q105 (Q205)
Q106 (Q206)
RL301 RELAY (I)
Q101 (Q201)
A1
Q102 (Q202)
K1
K2
Q104 (Q204)
70μs (I)
F2
Q333
I1
Q333
I2
REC EQ (I) Q113
BIAS (I)
Q112 (Q212)
D1
PB EQ (II) Q109
Q337
F2
REC/PB HEAD (II)
Q108 (Q208)
Q110 (Q210)
Q111 (Q211)
RL302 RELAY (II)
A2
70μs (II)
F1
REC EQ (II) Q116
Q332
COPY
BIAS (II)
FLAT AMP Q107
G1
Q115 (Q215)
D2
G2
COPY
※ OMITTED REC EQ SELECTOR
BIAS AMP. (I)
Q313
+B
BIAS OSC
BIAS (I)
ERASE HEAD (I)
CrO2 (I)
METAL (I)
Q312
B1
Q320
C
−B
BIAS AMP. (II)
Q317
BIAS (II)
CrO2 (II)
ERASE HEAD (II)
METAL (II)
Q316
B2
PD3031
Q343
A1
B1
RL301 RELAY (I)
Q302
Q301
56 I REC SW
DOL. REC 59
DOLBY NR UNIT
H
Q706
Q344
57 II REC SW
A2
B2
RL302 RELAY (II)
Q305
Q304
Q335
J2
J1
Q328
54 BIAS
C
dbx
ON
OFF
+B
Q338
Q326
60 I REC MUTE
I2
D1
Q325
61 II REC MUTE
I1
D2
Q327
E
62 LINE MUTE
F1
Q306
58 I PB SW
X2 SIG 64
Q341
K2
F2
Q340
Q339
K1
G1
Q334
63 COPY SW
Q303
G2

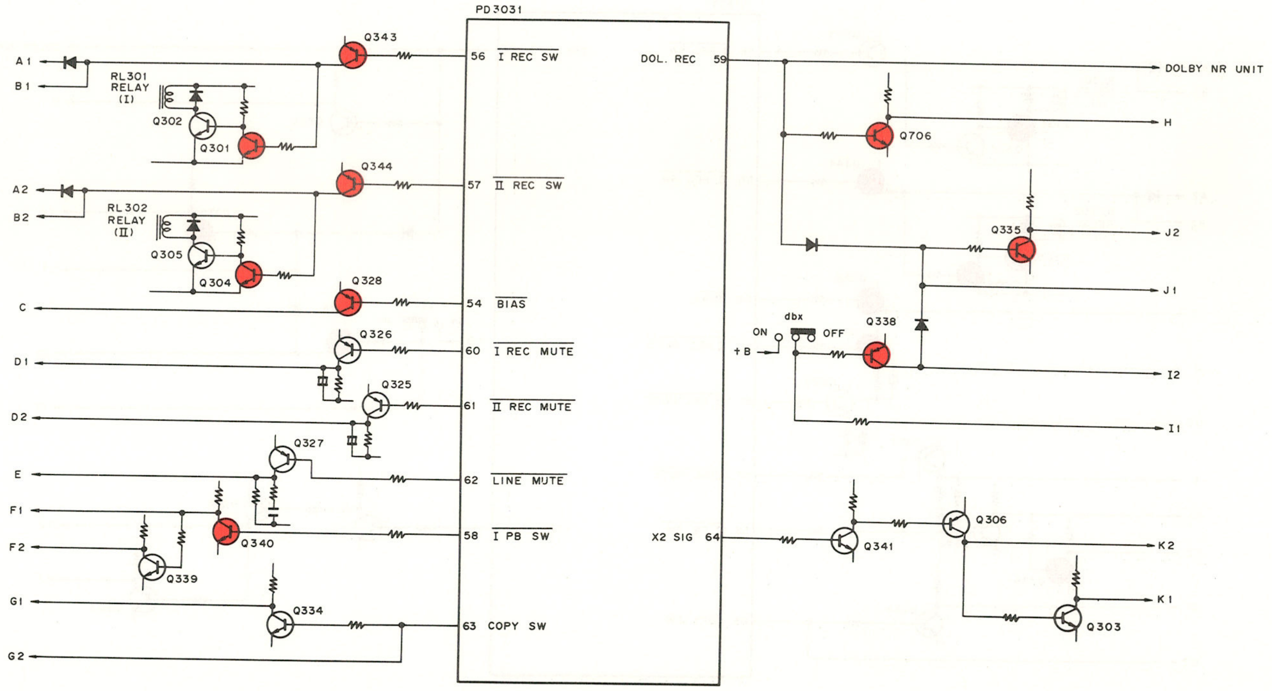
● Parallel Recording

Deck I : REC

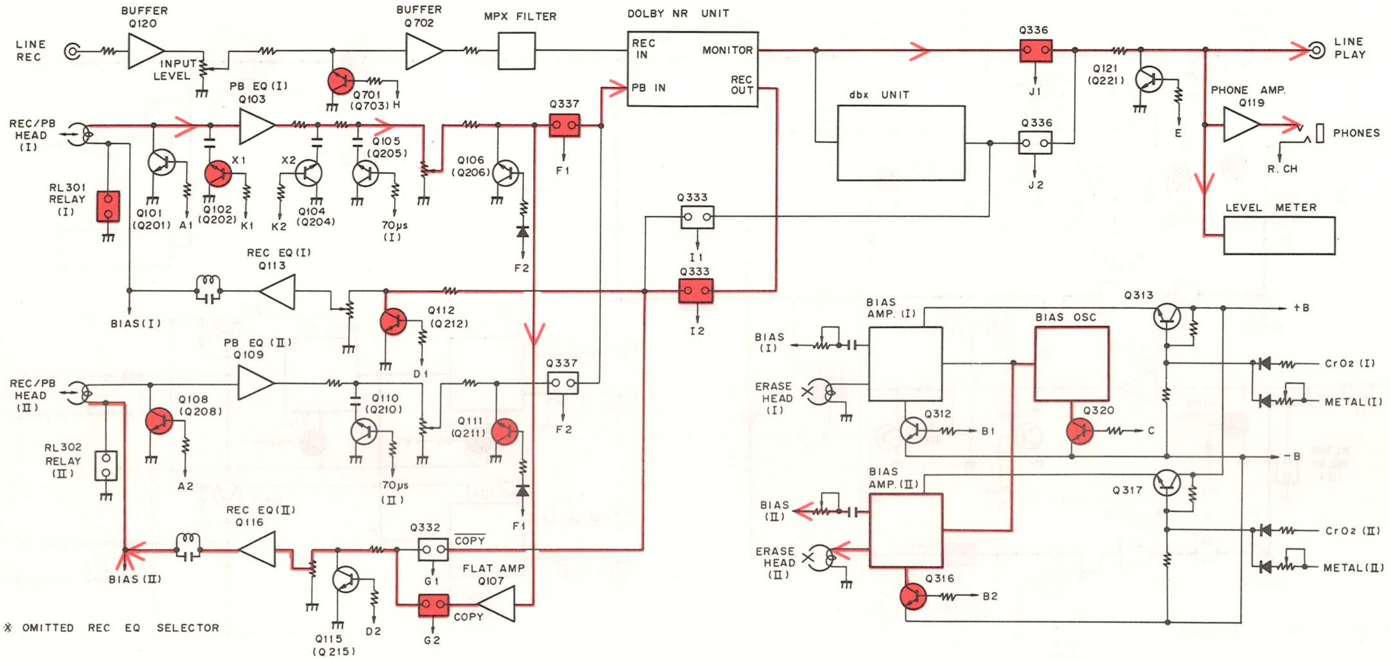
Deck II : REC


LINE REC
BUFFER Q120
INPUT LEVEL
PB EQ (I) Q103
Q701 (Q703) H
BUFFER Q702
MPX FILTER
DOLBY NR UNIT
REC IN
MONITOR
PB IN
REC OUT
Q336
J1
Q121 (Q221)
E
LINE PLAY
PHONE AMP. Q119
PHONES
R. CH
dbx UNIT
Q336
J2
LEVEL METER
REC/PB HEAD (I)
RL301 RELAY (I)
Q101 (Q201)
A1
Q102 (Q202)
X1
K1
X2
K2
Q104 (Q204)
Q105 (Q205)
70μs (I)
Q106 (Q206)
F2
Q337
F1
Q333
I1
Q333
I2
REC EQ (I) Q113
BIAS (I)
Q112 (Q212)
D1
PB EQ (II) Q109
REC/PB HEAD (II)
RL302 RELAY (II)
Q108 (Q208)
A2
Q110 (Q210)
70μs (II)
Q111 (Q211)
F1
Q337
F2
REC EQ (II) Q116
BIAS (II)
Q332
COPY
G1
FLAT AMP Q107
COPY
G2
Q115 (Q215)
D2
BIAS AMP. (I)
BIAS OSC
Q313
+B
BIAS (I)
ERASE HEAD (I)
Q312
B1
Q320
C
CrO2 (I)
METAL (I)
-B
BIAS AMP. (II)
Q317
BIAS (II)
ERASE HEAD (II)
Q316
B2
CrO2 (II)
METAL (II)

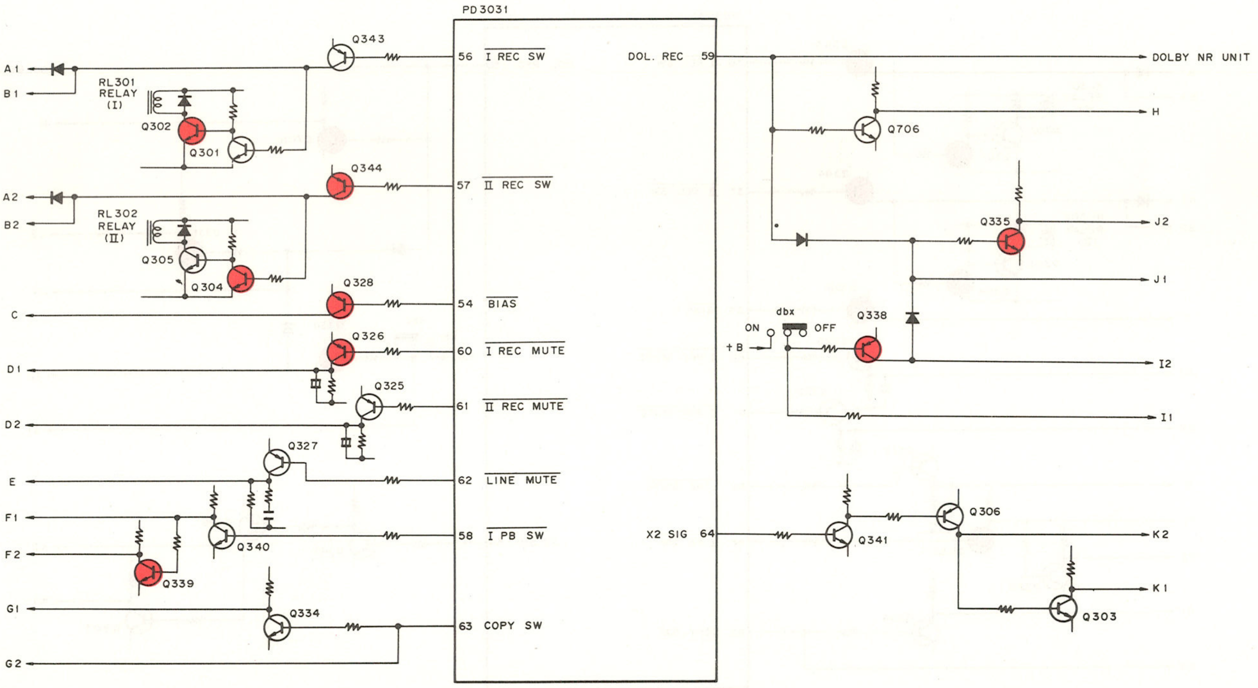
※ OMITTED REC EQ SELECTOR


PD3031
A1
B1
Q343
RL301 RELAY (I)
Q302
Q301
56 I REC SW
DOL. REC 59
DOLBY NR UNIT
H
Q706
A2
B2
Q344
RL302 RELAY (II)
Q305
Q304
57 II REC SW
Q335
J2
J1
C
Q328
54 BIAS
dbx
ON
OFF
+B
Q338
I2
D1
Q326
60 I REC MUTE
Q325
61 II REC MUTE
I1
D2
Q327
E
62 LINE MUTE
F1
F2
Q340
58 I PB SW
X2 SIG 64
Q341
Q306
K2
Q339
G1
Q334
63 COPY SW
K1
Q303
G2

COPY
Deck I : PLAY
Deck II : REC


LINE REC
BUFFER Q120
INPUT LEVEL
PB EQ (I) Q103
Q701 (Q703) H
BUFFER Q702
MPX FILTER
DOLBY NR UNIT
REC IN
MONITOR
PB IN
REC OUT
Q336
J1
Q121 (Q221)
LINE PLAY
dbx UNIT
Q336
J2
PHONE AMP. Q119
PHONES
R. CH
LEVEL METER
REC/PB HEAD (I)
RL301 RELAY (I)
Q101 (Q201)
A1
Q102 (Q202)
X1
K1
X2
K2
Q104 (Q204)
Q105 (Q205)
70μs (I)
Q106 (Q206)
Q337
F1
F2
Q333
I1
Q333
I2
REC EQ (I) Q113
BIAS (I)
Q112 (Q212)
D1
PB EQ (II) Q109
REC/PB HEAD (II)
Q108 (Q208)
RL302 RELAY (II)
A2
Q110 (Q210)
70μs (II)
Q111 (Q211)
Q337
F2
F1
REC EQ (II) Q116
BIAS (II)
Q332
COPY
G1
FLAT AMP Q107
Q115 (Q215)
D2
COPY
G2
BIAS AMP. (I)
Q313
+B
BIAS OSC
BIAS (I)
ERASE HEAD (I)
CrO2 (I)
METAL (I)
Q312
B1
Q320
C
-B
BIAS AMP. (II)
Q317
BIAS (II)
ERASE HEAD (II)
CrO2 (II)
METAL (II)
Q316
B2

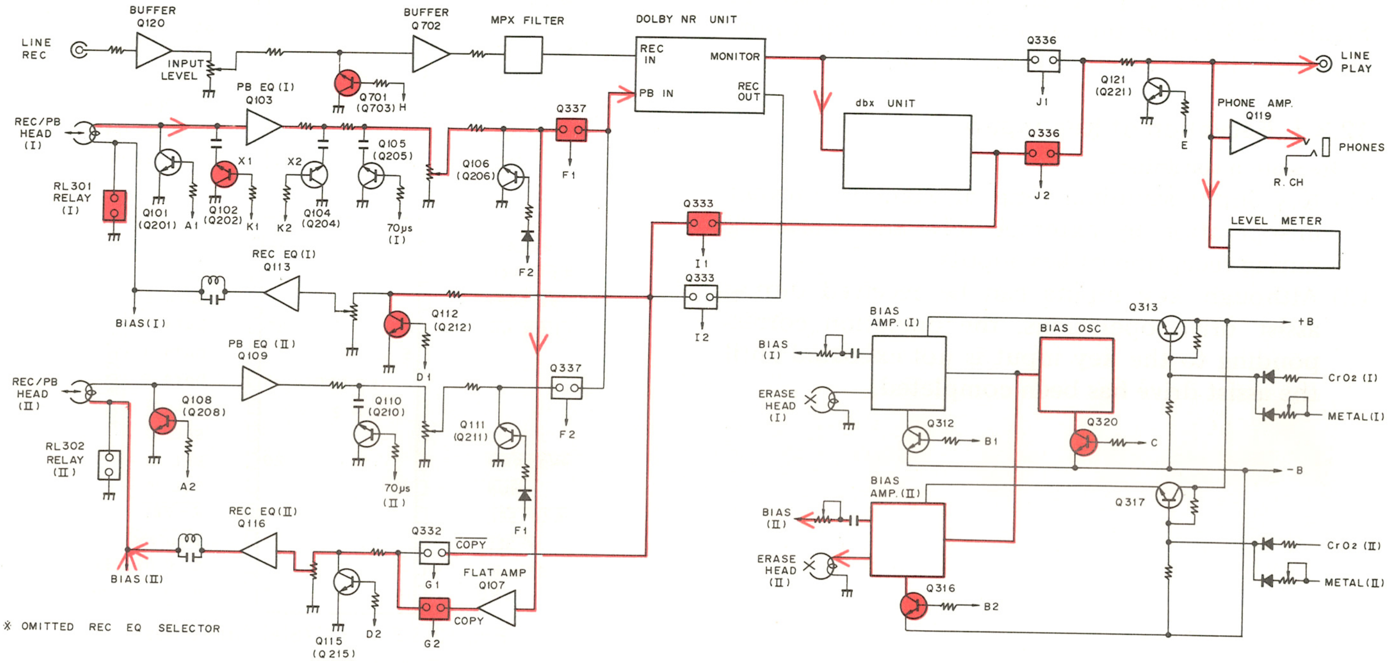
※ OMITTED REC EQ SELECTOR


PD3031
A1
B1
RL301 RELAY (I)
Q302
Q301
Q343
56 I REC SW
DOL. REC 59
DOLBY NR UNIT
H
Q706
A2
B2
RL302 RELAY (II)
Q305
Q304
Q344
57 II REC SW
Q335
J2
J1
C
Q328
54 BIAS
dbx
ON
OFF
+B
Q338
D1
Q326
60 I REC MUTE
I2
D2
Q325
61 II REC MUTE
I1
E
Q327
62 LINE MUTE
F1
F2
Q340
Q339
58 I PB SW
X2 SIG 64
Q341
Q306
K2
K1
Q303
G1
Q334
63 COPY SW
G2

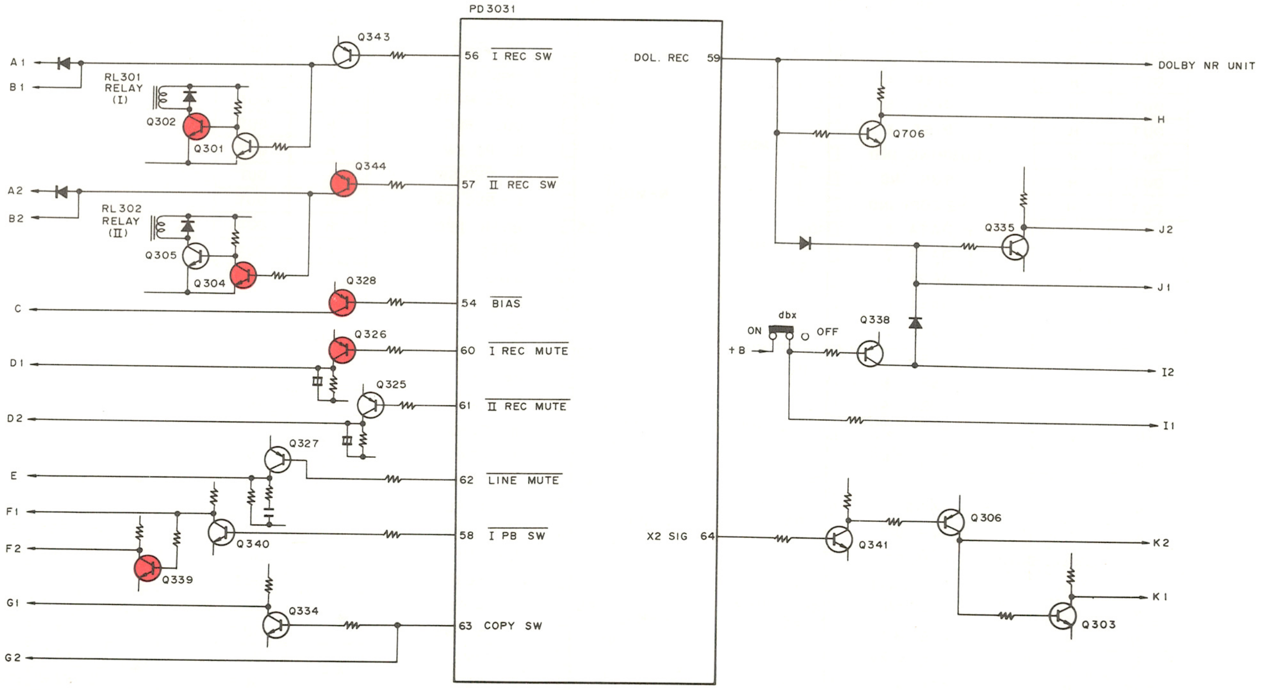
COPY

- dbx : ON

Deck I : PLAY
Deck II : REC


BUFFER
Q120
LINE
REC
INPUT
LEVEL
BUFFER
Q702
MPX FILTER
DOLBY NR UNIT
REC
IN
MONITOR
PB IN
REC
OUT
Q336
LINE
PLAY
Q701
(Q703)
H
PB EQ (I)
Q103
REC/PB
HEAD
(I)
Q337
dbx UNIT
J1
Q121
(Q221)
PHONE AMP.
Q119
PHONES
E
Q336
J2
R. CH
X1
X2
Q105
(Q205)
Q106
(Q206)
F1
RL301
RELAY
(I)
Q101
(Q201)
A1
Q102
(Q202)
K1
K2
Q104
(Q204)
70μs
(I)
Q333
LEVEL METER
F2
I1
Q333
REC EQ (I)
Q113
BIAS (I)
Q112
(Q212)
I2
D1
BIAS
AMP. (I)
Q313
+B
BIAS OSC
BIAS
(I)
PB EQ (II)
Q109
REC/PB
HEAD
(II)
Q337
ERASE
HEAD
(I)
CrO2 (I)
METAL (I)
Q108
(Q208)
Q110
(Q210)
Q111
(Q211)
F2
Q312
B1
Q320
C
RL302
RELAY
(II)
-B
A2
70μs
(II)
BIAS
AMP. (II)
Q317
F1
REC EQ (II)
Q116
BIAS
(II)
Q332
COPY
CrO2 (II)
ERASE
HEAD
(II)
METAL (II)
BIAS (II)
G1
FLAT AMP
Q107
Q316
B2
D2
COPY
Q115
(Q215)
G2

※ OMITTED REC EQ SELECTOR


PD3031
Q343
A1
B1
RL301
RELAY
(I)
Q302
Q301
56 I REC SW
DOL. REC 59
DOLBY NR UNIT
H
Q706
Q344
A2
B2
RL302
RELAY
(II)
Q305
Q304
57 II REC SW
Q335
J2
Q328
C
54 BIAS
J1
dbx
ON
OFF
+B
Q338
Q326
D1
60 I REC MUTE
I2
Q325
D2
61 II REC MUTE
I1
Q327
E
62 LINE MUTE
F1
Q340
58 I PB SW
X2 SIG 64
Q341
Q306
K2
F2
Q339
K1
Q303
G1
Q334
63 COPY SW
G2

12.3 SYSTEM CONTROL IC (PD3031A) SPECIFICATIONS

PD3031A controls the double deck operations (tape transport mechanism consisting of two motors plus one assist motor) by coupling with two input port expansion ICs (LC7800).

The PD3031A port allocations are listed in Figure 12-3-1, and the pin names of the input port expansion IC are listed in Figure 12-3-2.

12.3.1 Reception of Key Inputs

*** Reception conditions**

(1) Key input sampling time of 20ms to prevent misoperation by external noise and chattering during reception of key inputs.

(2) Although key inputs can be received during assist drive operations, the operation corresponding to the key input is not executed until the assist drive has been completed.

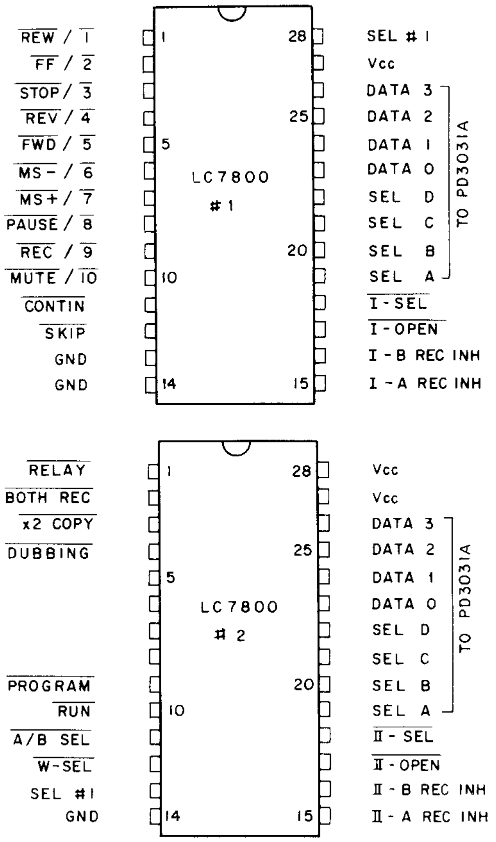
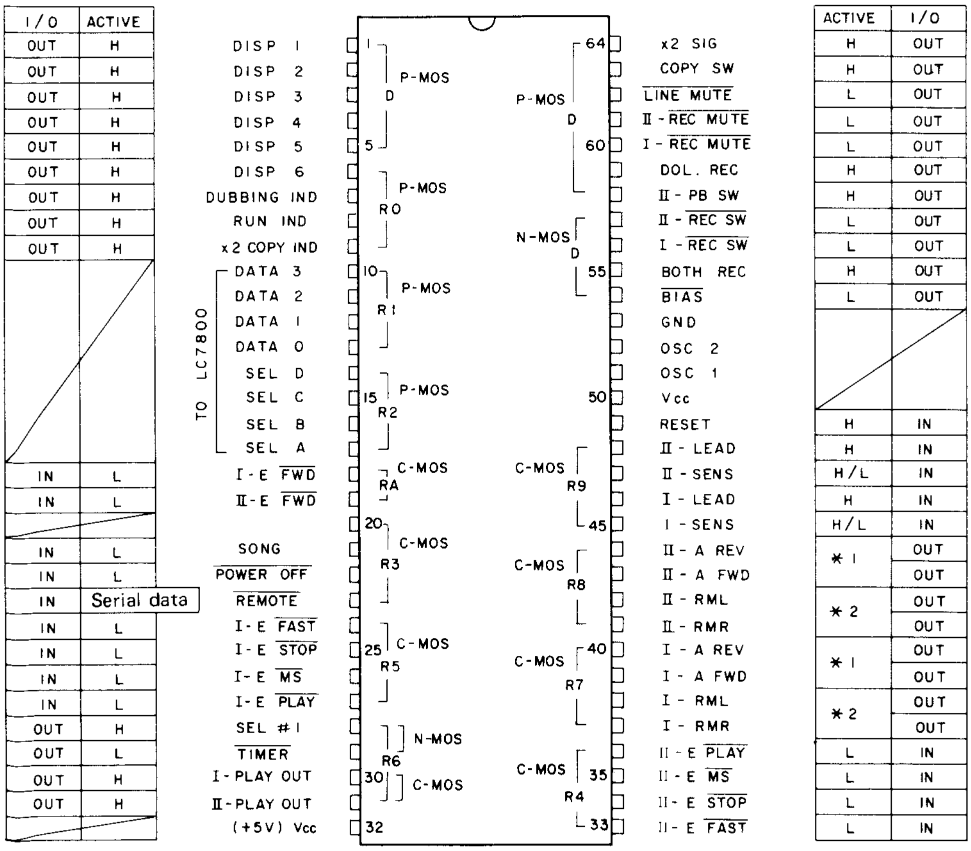

REW / 1
FF / 2
STOP / 3
REV / 4
FWD / 5
MS− / 6
MS+ / 7
PAUSE / 8
REC / 9
MUTE / 10
CONTIN
SKIP
GND
GND
1
5
10
14
15
20
25
28
LC7800
# 1
SEL # 1
Vcc
DATA 3
DATA 2
DATA 1
DATA 0
SEL D
SEL C
SEL B
SEL A
TO PD3031A
I - SEL
I - OPEN
I - B REC INH
I - A REC INH
RELAY
BOTH REC
x2 COPY
DUBBING
PROGRAM
RUN
A/B SEL
W-SEL
SEL #1
GND
LC7800
# 2
Vcc
Vcc
DATA 3
DATA 2
DATA 1
DATA 0
SEL D
SEL C
SEL B
SEL A
TO PD3031A
II - SEL
II - OPEN
II - B REC INH
II - A REC INH

Fig. 12-3-2 LC7800 Pin names


I/O
ACTIVE
OUT H DISP 1
OUT H DISP 2
OUT H DISP 3
OUT H DISP 4
OUT H DISP 5
OUT H DISP 6
OUT H DUBBING IND
OUT H RUN IND
OUT H x2 COPY IND
DATA 3
DATA 2
DATA 1
DATA 0
SEL D
SEL C
SEL B
SEL A
TO LC7800
IN L I-E FWD
IN L II-E FWD
IN L SONG
IN L POWER OFF
IN Serial data REMOTE
IN L I-E FAST
IN L I-E STOP
IN L I-E MS
IN L I-E PLAY
OUT H SEL #1
OUT L TIMER
OUT H I-PLAY OUT
OUT H II-PLAY OUT
(+5V) Vcc
1
5
10
15
20
25
30
32
33
35
40
45
50
55
60
64
P-MOS D
P-MOS R0
P-MOS R1
P-MOS R2
C-MOS RA
C-MOS R3
C-MOS R5
N-MOS R6
C-MOS
P-MOS D
N-MOS D
C-MOS R9
C-MOS R8
C-MOS R7
C-MOS R4
x2 SIG H OUT
COPY SW H OUT
LINE MUTE L OUT
II - REC MUTE L OUT
I - REC MUTE L OUT
DOL. REC H OUT
II - PB SW H OUT
II - REC SW L OUT
I - REC SW L OUT
BOTH REC H OUT
BIAS L OUT
GND
OSC 2
OSC 1
Vcc
RESET H IN
II - LEAD H IN
II - SENS H/L IN
I - LEAD H IN
I - SENS H/L IN
II - A REV ∗1 OUT
II - A FWD OUT
II - RML ∗2 OUT
II - RMR OUT
I - A REV ∗1 OUT
I - A FWD OUT
I - RML ∗2 OUT
I - RMR OUT
II - E PLAY L IN
II - E MS L IN
II - E STOP L IN
II - E FAST L IN
ACTIVE
I/O

∗1		A FWD	
		H	L
A REV	H	STOP	REV
	L	FWD	STOP

∗2		RML	
		H	L
RMR	H	STOP	FF
	L	REW	STOP

Fig. 12-3-1 PD3031A Port allocation

*** Recording prevention function (REC INH)**

Tape transport is put into stop mode when a REC input is applied with REC INH at H level during tape transport in either deck and in either direction. If there is no REC key input, however, the deck is not put into stop mode.

And if a FWD or REV key input which results in reversing the tape transport direction during recording, recording/pause, or recording mute mode, or if REC INH is H following the direction reversal, the deck is put into stop mode after the direction has been reversed.

I—A-REC INH	Deck I FWD transport REC INH input.
I—B-REC INH	Deck I REV transport REC INH input.
II—A-REC INH	Deck II FWD transport REC INH input.
II—B-REC INH	Deck II REV transport REC INH input.

*** Tape transport input keys**

(1) Basic key inputs
The basic deck control keys (including the ten numerical keys). See Figure 12-3-3.

(2) Function key inputs
BOTH REC, DUBBING, X2 COPY, and the key switching inputs I SEL, II SEL, and PROGRAM. See Figure 12-3-4.

(3) Auxiliary key inputs
Keys which operate only after certain modes have been set by another key. RELAY, A/B SEL, RUN, MUTE, and SKIP. See Figure 12-3-5.

Port Name	ACTIVE	Description
REW/1	L	REW and key 1 input
FF/2	L	FF and key 2 input
STOP/3	L	STOP and key 3 input
REV/4	L	REV-PLAY and key 4 input
FWD/5	L	FWD-PLAY and key 5 input
MS⊖/6	L	(−) SEARCH and key 6 input
MS⊕/7	L	(+) SEARCH and key 7 input
PAUSE/8	L	PAUSE and key 8 input
REC/9	L	REC and key 9 input
*MUTE/10	L	REC MUTE and key 10 input
OPEN	L	Door detector input — door open: L

* Although MUTE is not included among the basic tape transport keys, it has been included in this list because of key 10.

Fig. 12-3-3 Basic key inputs

Port Name	ACTIVE	Description
I SEL	L	Transport I key mode switching input
II SEL	L	Transport II key mode switching input
PROGRAM	L	Numerical key switching (initialized state recovery)
BOTH REC	L	BOTH REC key input (*1)
DUBBING	L	DUBBING Key input (*2)
X2 COPY	L	X2 COPY key input (*3)

*1: PARALLEL REC
*2: NORMAL SPEED COPY
*3: HIGH SPEED COPY

Fig. 12-3-4 Function key inputs

*** Multi-mode keys**

The following three modes are set by the I SEL, II SEL, and PROGRAM inputs with the basic keys and MUTE key.

I SEL ..... (1) Deck I basic keys plus REC MUTE key mode.
II SEL ..... (2) Deck II basic keys plus REC MUTE key mode.
PROGRAM ... (3) Ten key mode (numerical key 1 thru 10).

(1) and (2) differ only in the deck being controlled. The correspondence between (1)/(2) and (3) is shown in Figure 12-3-6.

*** One-touch recording**

(1) Deck I and deck II are switched to REC mode by the respective deck I or deck II key mode REC input.
(2) Recording pause mode can be set by pressing the REC key during stop pause or playback pause mode.

*** Pause operations**

(1) Pause mode is released by pressing the PAUSE key.
(2) Pause mode can also be released by pressing the STOP, FF, REW, MS+, or MS– key.

*** Multiple input of transport keys, or transport key and other function key**

Inputs are not accepted if keys are pressed exactly at the same time (simultaneous reading of input data).

*** Multiple input of tape transport control keys**

(1) If key 1 and key 2 are pressed together, and mutual transition is possible between the key 1 and key 2 transport modes, or if multiple pressing has been permitted for those keys, the mode of the last key to be released becomes valid.

(a) When the MUTE and PAUSE keys are pressed together

Mutual transition is possible between recording pause and recording mute modes. If these two keys are pressed together during recording mode, the deck is set to recording pause mode. And if these two keys are pressed together during recording pause mode and the PAUSE key is released first, the deck is put into recording mute mode. And the deck remains in recording pause mode if the MUTE key is released first.

(b) When the REC key is pressed together with the FWD or REV key

Although transition from playback to recording mode is possible, transition from recording to playback mode has not been defined. Therefore, if the REC key is pressed together with the FWD or REV key, the deck is switched to recording mode irrespective of which key is released first.

(c) When REC and PAUSE keys are pressed together

If the REC and PAUSE keys are pressed together, the deck is switched to recording pause mode irrespective of which key is released first.

(d) When REC and MUTE keys are pressed together

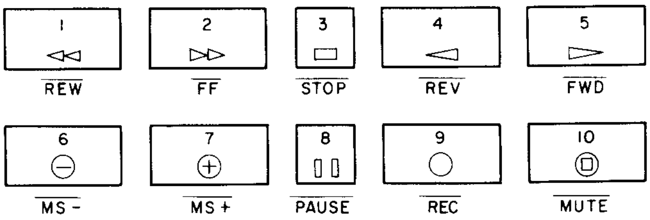


Fig. 12-3-6 Multi-mode key inputs

Port Name	ACTIVE	Description
RELAY	L	RELAY key input
A/B SEL	L	Programming A/B switching input (*1)
RUN	L	Program RUN key input (*2)
MUTE	L	REC MUTE key input
SKIP	L	SKIP key input (*3)

*1: PROGRAM SIDE B
*2: PROGRAM START
*3: Not used

Fig. 12-3-5 Auxiliary key inputs

Mutual transition between recording and recording mute modes is possible. If these two keys are pressed together the deck is set to recording mute mode. The order in which the keys are released is important, the deck being put into recording mute mode is the REC key is released first, or to recording mode if the MUTE key is released first.

(e) When FWD or REV and PAUSE keys are pressed together

Although playback mode can be switched to playback pause mode by pressing the PAUSE key, transition from playback pause mode to playback mode by pressing the PLAY key has not been defined. Therefore, if the FWD or REV key is pressed together with the PAUSE key, the deck is switched to playback pause mode irrespective or which key is released first.

12.3.2 REC MUTE Function

(1) If the MUTE key is pressed during recording or recording pause mode, the deck is switched to recording mute mode for 4.5 seconds, and then back to recording pause mode (Auto space mute). The REC IND blinks on and off (640ms cycle) during this 4.5 second interval.

(2) If the MUTE key is kept depressed for at least 4.5 seconds during recording or recording pause mode, the deck is switched to recording mute mode until the key is released again, after which the deck is put into recording pause mode. The REC IND blinks on and off while the MUTE key remains depressed.

(3) If the PAUSE key is pressed during Auto space mute mode, Auto space mute is changed to recording pause mode.

(4) If the REC key is pressed during Auto space mute mode, Auto space mute is changed to recording mode.

(5) If the REC and MUTE keys are pressed together, the tape transport assist operation is executed in recording mode, and the deck subsequently switched to Auto space mute mode once that operation has been completed.

(6) If the PAUSE and MUTE keys are pressed together during recording pause mode, that recording pause mode is maintained.

(7) Although FWD and REV key inputs are accepted during recording mute mode, there is no change if the key in the same direction as the tape transport is pressed. If the opposite direction key is pressed, the tape transport direction is reversed, and the Auto space mute time is initialized before restarting.

(8) If the MUTE key is pressed together with the FWD or REV key, the recording mute mode is started in the pressed direction.

12.3.3 Timer Function

1. The CT-S99WR is equipped with two timer functions — timer playback and timer recording. The timer playback function can only be used in deck I, but the timer recording function involves relay recording from deck I to deck II. The two timer functions are selected by the TIMER switch.
2. The timer functions are activated 4 seconds after the microcomputer has been reset. Details are described under "Timer sense process" below.
3. Timer sense process
   (1) During interval "a" in Figure 12-3-7 below, the deck first checks that no basic transport key, REC MUTE key, function key, nor auxiliary key has been pressed.
   (2) During interval "b", the deck checks that the FWD and REC keys have been switched to L level together with the TIMER SENSE output.
   (3) During interval "c", the "a" interval check is repeated.
   (4) Timer operation is not executed if pressing of a key is detected during the "a" or "c" interval.
   (5) If only the FWD input is L during interval "b", tape transport is put into forward playback mode is in FWD mode, or into reverse playback if in REV mode.
4. Timer recording
   (1) Timer recording mode is always started from deck I in conjunction with relay recording mode. The reverse mode selection and relay mode end process conditions are the same as in normal relay recording mode.
   (2) If a key input is detected during the "a" or "c" intervals in Figure 12-3-7, the operation specified by that key is executed instead of the timer operation. If the PAUSE, MS+, or MS- key has been pressed, however, the deck is returned to stop mode.

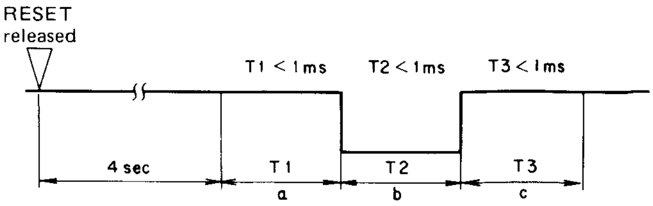


Fig. 12-3-7 Timer sense process timing

12.3.4 MS Function

1. Music search operations are executed by input of MS+ and MS– keys. Cue[*1] and review[*2] operations differ, however, depending on the tape travel direction when the MS+ or MS– key is pressed.

Tape travel direction \ Key input	MS+	MS–
FWD (Forward)	CUE	REVIEW
REV (Reverse)	REVIEW	CUE

2. Finding the start of a tune during cue and review modes
   (1) After the start of a tune is detected by the leading edge of the SONG input during forward cue or reverse review mode, the tape continues for another 280ms before being reversed to forward review or reverse cue mode, and then being reversed again to playback mode from the SONG input trailing edge.
   (2) If initially in forward review or reverse cue mode, playback mode is started when the SONG input trailing edge is detected.
3. The MS+ and MS– key inputs can be received for music search operations when the PD3031A is in NON mode[*3].

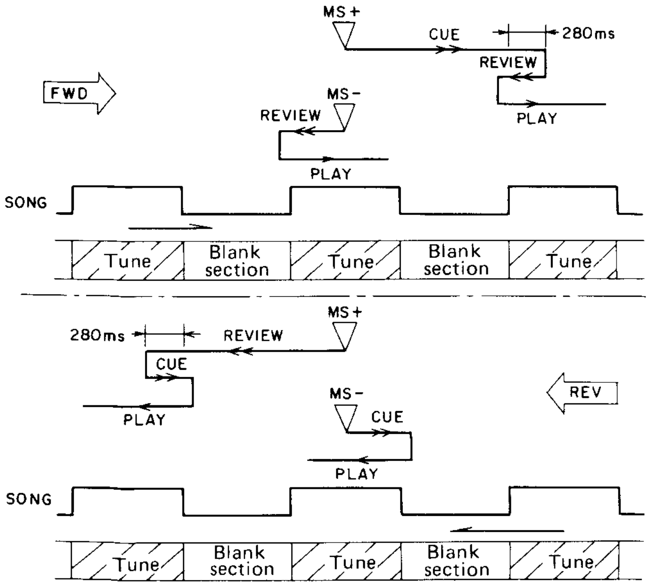


Fig. 12-3-8 MS Operation

4. Skip music search
   (1) By pressing the MS+ or MS– key a specific number of times, the music search operation can be skipped up to ten tunes forward or nine tunes back from the tune currently being played. For example, if the MS+ key is pressed three times, the tape is advanced by three tunes. The indicator numbers light up in succession each time the key is pressed, and are turned off again in the reverse order each time a blank section of tape between tunes is detected in cue mode. Tape transport is reverted to playback mode from the beginning of the third tune. If the end of the tape is reached during a skip music search operation, the end processing is the same as in cue and review modes.

12.3.5 Skip Function (Not Used In This Model)

(1) The SKIP key is a self set/reset type switch where the function is switched on when the key is pressed once, and switched off again when pressed a second time.
(2) The switch is off in the initial reset condition.
(3) The SKIP indicator is on when the skip function is on, and off when the function is off.
(4) If the SONG input remains at L level for at least 8 seconds during playback mode, forward playback is switched to cue mode and reverse playback is switched to review mode. This mode is then returned to playback mode when the beginning of the next tune is located.
(5) If the end of tape is detected during forward cue or reverse review mode, the tape transport direction is reversed when repeat mode has been set, resulting in the tape continuing in review mode in the reverse direction or in cue mode in the forward direction. When the beginning of the next tune is located, the tape is returned to playback mode.
(6) If the deck is switched from playback to palyback pause mode by pressing the PAUSE key while the internal timer is counting 8 seconds with the SONG input at L level, the timer counter is reset. If the PAUSE key is then pressed to return to playback mode, the counting operation is started again.

[*1] *Cue mode: Fast forward mode with head base in music search position.*

[*2] *Review mode: Rewind mode with head base in music search position.*

[*3] *NON mode: Refers to the condition where the PD3031A has not been put into any mode at all.*

(7) The music search operation is executed in the same way as when the MS+ and MS– keys are used. Detection of the SONG input is enabled 160ms after the reel motors have been started by PLAY, CUE, or REVIEW.

(8) Although the internal timer counts 8 seconds with the SONG input at L level, and cue mode is started in the tape is in the forward direction (or review mode if in the reverse direction), the cue or review mode is continued for another 280ms if the SONG input is at H level when SONG input detection has been enabled 160ms after the reel motor has been switched on. The beginning of the tune is subsequently detected in review mode if tape transport direction is forward, or in cue mode if reverse. This mode is then switched to playback mode from the beginning of the tune.

(9) The SKIP key input cannot be received if the deck is already in program input, playback, dubbing, x2 copy, or BOTH REC mode.

(10) The deck is switched to skip function and the SKIP indicator is turned on when the SKIP key input is received.

(11) The skip function is switched off and the SKIP indicator turned off if a PROGRAM, DUBBING, X2 COPY, or BOTH REC signal is received while the skip function is on.

13.3.6 Tape End Detector Function

*** Sensing end detector**

The tape end condition is detected and the tape end processing is executed when the sensing input remains at H or L level for at least 3 seconds when tape transport is in playback, recording, recording mute, fast forward, rewind, cue, or review mode.

The tape end process differs according to the selected reverse mode. See Figure 12-3-9. If a REC INH input is applied when the tape direction is reversed during endless recording mode with RELAY OFF, the tape is stopped after being reversed to the REV direction. If the relay function has been switched on, that relay condition is cancelled.

*** Sensing tape end processing**

Reverse mode	Current transport mode	RELAY OFF	RELAY ON
⇄	FF, REW, CUE, REVIEW	STOP	STOP
	PLAY, REC	STOP	Current deck is stopped, and mode is relayed to the other deck.
	SPACE REC MUTE	STOP	Current deck is stopped, and the other deck is put into recording pause mode.
	NORMAL REC MUTE	STOP	Current deck is stopped, and the other deck is put into recording pause or space recording mute mode.
↻	FF, REW	STOP	STOP
	FWD-PLAY	REV-PLAY	REV-PLAY
	REV-PLAY	FWD-PLAY	Current deck is stopped, and the other deck is put into playback mode.
	FWD-REC	REV-REC	REV-REC
	REV-REC	STOP	Current dekc is stopped, and the other deck is put into recording mode.
	FWD SPACE REC MUTE	REV SPACE REC MUTE	REV-REC-PAUSE
	FWD NORMAL REC MUTE	REV SPACE REC MUTE	REV-REC-PAUSE
	REV SPACE REC MUTE	STOP	Current deck is stopped, and the other deck is put into recording pause mode.
	REV NORMAL REC MUTE	STOP	Current deck is stopped, and the other deck is put into recording pause or space recording mute mode.
	FWD-CUE	REV-REVIEW	
	REV-REVIEW	FWD-CUE	
	FWD-REVIEW, REV-CUE	STOP	

Fig. 12-3-9 Sensing end processing

*** Leader tape end detection**

If the LEADER input is switched to H level during playback, recording, recording mute, x2 copy, both recording, or dubbing mode, the end of the leader tape is detected, and the corresponding tape transport end processing is executed.

End processing is not executed if the LEADER input is switched to H level within 8 seconds after changing to normal speed tape transport (including x2 copy mode). The end processing corresponding to the selected reverse mode is shown in Figure 12-3-10.

12.3.7 Relay Function

Tape transport modes can be "relayed" from deck I to deck II and from deck II to deck I by the relay function. The RELAY key settings are "cyclic", and the inputs can be received during NON mode or when the skip function is on. The relay function operates differently depending on whether the function is started in playback or recording mode (see Figure 12-3-11).

Reverse mode	Current tape transport mode	Transport mode of the other deck following end processing in the current deck
⇄	FWD–PLAY	Playback mode continued in tape travel direction already set at the time.
	REV–PLAY	Ditto
	FWD–REC	Recording mode continued in tape travel direction already set at the time. (*)
	REV–REC	Ditto (*)
↻	REV–REC	Recording mode continued in tape trave' direction already set at the time (*)
	REV–PLAY	Forward playback irrespective of the travel direction.

*: Relay function cancelled

Fig. 12-3-11 Relay operations

Reverse move	Deck I	Deck II	Result
⇄	FWD	FWD	Mode cancelled when first tape end is reached.
	FWD	REV	Ditto
↻	FWD	REV	Mode cancelled when first reverse direction tape end is reached (after automatic reversal from forward to reverse direction in deck I).

Fig. 12-3-12 Both (parallel) recording mode

*** Processing by leader tape detector pulse**

Reverse mode	Current transport mode	RELAY OFF	RELAY ON
⇄	FF, REW, CUE, REVIEW	No change	
	PLAY, REC	No change	Current deck is stopped, and mode is relayed to the other deck.
	SPACE REC MUTE	No change	Ditto
	NORMAL REC MUTE	No change	Ditto with other tape switched to recording mute mode.
↻	FF, REW, CUE, REVIEW	No change	
	FWD-PLAY	REV-PLAY	REV-PLAY
	REV-PLAY	FWD-PLAY	Current deck is stopped, and the other deck is put into recording mode.
	FWD-REC	REV-REC	REV-REC
	REV-REC	No change	Current deck is stopped, and the other deck is put into recording mode.
	FWD SPACE REC MUTE	REV SPACE REC MUTE	REV SPACE REC MUTE
	FWD NORMAL REC MUTE	REV SPACE REC MUTE	REV SPACE REC MUTE
	REV SPACE REC MUTE	No change	Current deck is stopped, and the other deck is put into recording pause mode.
	REV NORMAL REC MUTE	No change	Current deck is stopped, and the other deck is put into recording pause mode.

Fig. 12-3-10 Leader tape end processing

(1) If the tape end is detected during endless forward recording or playback mode, the tape direction is reversed, but the relay function is not activated.

(2) The tape transport mode of the current deck, and the transport mode of the other deck following the relay operation are shown in Figure 12-3-11. The current tape transport stops once the relay operation has been completed.

(3) If the tape end is detected within 6 seconds after the relay operation during relay playback or recording mode, the tape is stopped and no further relay is executed.

(4) The basic routine followed in endless relay playback mode is

I—FWD → I—REV → II—FWD → II—REV ↲

(5) Tape transport is stopped following completion of reverse direction playback after six relay operations have been executed.

(6) Relay mode is cancelled if the other deck is in recording inhibited status when recording mode is relayed from the current deck.

(7) The relay function is cancelled and the RELAY indicator is switched off if a PROGRAM, DUBBING, X2 COPY, or BOTH REC input is keyed in.

(8) The key input mode is relayed from deck I to deck II together with the relayed transport mode.

(9) The relay function remains effective even if the other deck is in fast forward or rewind mode.

(10) Tape transport in the other deck is stopped following the relay if recording in that deck has been inhibited by being in fast forward or rewind mode.

12.3.8 Both (Parallel) Recording Function

The parallel recording function enables simultaneous recording in both deck I and deck II. The BOTH REC input can only be received in NON mode with both decks in stop mode. Parallel recording mode is set, and the I-SEL and II-SEL indicators come on when the input is received. In this condition, only STOP, REC, PAUSE, and MUTE keys can be used. Input from any other basic key is not accepted.

Key name	Function
STOP	Synchronized stopping of decks I and II, and mode cancellation.
REC	REC key for decks I and II.
MUTE	Synchronized REC MUTE key for decks I and II.
PAUSE	Synchronized PAUSE key for decks I and II.

(1) The four keys listed above are shared by both decks.

(2) When parallel recording is cancelled by pressing the STOP key, both decks are switched to NON mode and the two tape transport mechanisms are stopped. The basic keys subsequently operate deck I, and the I—SEL indicator comes on.

(3) If a REC INH input is applied to either deck during parallel recording mode, both decks are stopped and the parallel recording mode is cancelled.

(4) If tape transport is stopped in one deck by reaching the end of the tape in that deck, both decks are again stopped and the parallel recording mode is cancelled.

(5) Parallel recording mode is executed according to REV mode and tape travel direction as shown in Figure 12-3-12.

(6) The automatic tape reversing operation at the end of the tape is executed independently in the two decks.

(7) Tape direction cannot be reversed manually.

12.3.9 Dubbing (Normal Speed Copy) Function

The dubbing function enables tapes to be copied from deck I to deck II, either in entirety or in conjunction with an editing function.

(1) The DUBBING key input is only accepted when both tape transport mechanisms are in stop mode.

(2) When the DUBBING key input is accepted, deck I is put into playback mode and deck II is put into recording mode, the signal path being switched by changing II PB SW to L level and COPY SW to H level. The DUBBING indicator is switched on by an H level signal. This condition is called "dubbing mode" where both I SEL and II SEL indicators are on.

(2) Input processing (±20% deviation permitted in all timing
   a. The input signal trailing edge is detected at the REMOTE terminal.
   b. The validity of the leader code is determined by the duration (approx. 12.3ms) of that code after the code "L" level has been detected.
   c. Custom code and data code "1" and "0" logic decisions are based on data pulse intervals (approx. 1.02ms for 0, and approx. 2.05ms for 1).

(3) Control processing
   a. When the remote control signal is valid, 25 different control modes can be used.
   b. Control modes are executed in the same way as with the corresponding key input.
   c. At the same time that a control mode is executed, the presence of a signal on the DATA IN terminal is also checked. If a signal break (of at least 300ms) is detected, the system is switched to input standby to wait for another remote control signal.
   d. If the data in the first remote control signal is invalid, the data in the second input is monitored, and subsequently executed if valid.
   e. If the data in the second signal is also invalid, the data in the third signal is monitored. This procedure is repeated.

Unit pulse width T3 : 0.5096ms
(Reception range 0.020ms < T3 < 0.9ms)

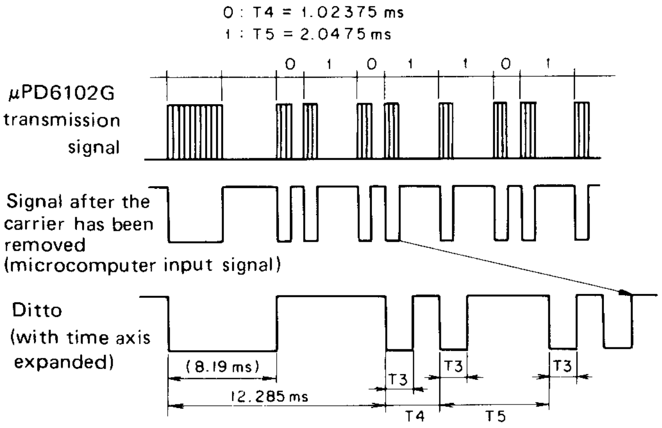

0 : T4 = 1.02375 ms
1 : T5 = 2.0475 ms
0 1 0 1 1 0 1
μPD6102G transmission signal
Signal after the carrier has been removed (microcomputer input signal)
Ditto (with time axis expanded)
(8.19 ms)
12.285 ms
T3
T3
T3
T4
T5

Fig. 12-3-14 Remote control input signal

12.3.12 Program Functions

Program functions can be divided into the following four modes.

(1) Program input mode
- (2) Program playback mode
- (3) Program x1 copy mode
- (4) Program x2 copy mode

(1) Program input mode

(1) Program input mode cannot be started unless both decks are in stop mode.

(2) Once the PROGRAM input has been received, the basic transport mode keys and the REC MUTE key become numerical keys 1 thru 10.

(3) The PROGRAM indicator lights up during program input mode.

(4) In the initialized state, the input program is recorded on side A (FWD). The input side can be switched by the A/B SEL key.

(5) To indicate the specified input side, the FWD (▷) indicator blinks on and off when side A has been specified, and the REV (◁) indicator blinks on and off when Side B has been specified. At the same time, indicators 1 thru 10 also blink on and off to indicate that input is possible.

(6) The maximum number of into tunes is ten in 10 steps per side.

(7) The keys 1 thru 10 indicate the tune number from the first tune on each side.

(8) If side B input is selected by the A/B SEL key while in side A input mode, the A/B SEL key cannot be used a second time, and no further input is possible on side A.

(9) No more than ten tunes can be accepted on each side. And after ten tunes have been accepted on side A, the next input tune is automatically accepted on side B.

(10) All indicators 1 thru 10 start to blink on and off when program input mode is activated. The blinking stops after the first tune is received, and the tune number is indicated instead.

(11) The memory sequence is the same as the input sequence.

For example, input in the following sequence

A—3, 5, 7,   B—2, 4, 8

results in

STEP 1	A—3
2	A—5
3	A—7
4	B—2
5	B—4
6	B—8

The program starts from A—3.

(12) Input of the same tune more than once is possible. The same tune can be accepted up to ten times per side.

(13) The RUN (START), DUBBING (NORMAL SPEED COPY), and X2 COPY (HIGH SPEED COPY) indicators blink on and off even if only a single tune is programmed.

(14) The numerical indicator corresponding to the input tune number lights up. When the A/B SEL key (SIDE B) is used to switch from side A to side B input mode, the side A tune number indicators go off, and the side B tune number indicators light up instead.

(15) If the same tune is programmed more than once, the tune number indicator is the same as the first time it was programmed.

(16) Although I SEL and II SEL switching from program input mode is possible, thereby returning to the respective deck I and deck II transport key modes in NON mode, the program data is cleared, and the tune number and input side indicators are turned off. The tape travel direction indicators stop blinking and indicate the current direction instead, and the RUN, DUBBING, and X2 COPY indicators are turned off.

(17) The memory is also cleared if the program key is pressed a second time after program input mode has been started. The indicators 1 thru 10 commence to blink on and off again to indicate a return to the initial input status.

(18) Once the program has been received, the indicators blink on and off momentarily to indicate that keys 1 thru 10 have been received.

(2) Program playback mode

Program playback mode is activated by pressing the RUN key when the RUN (START) indicator blinks on and off during program input mode.

* Current tune addressing

When program playback mode is started, the tape is rewound in forward mode and the current tune address is set by tape end. And if there is no input on side A (FWD side), the tape is started in reverse mode and is put into fast forward mode.

* Tune selection

In a program consisting, for example, of A—3 and A—5, the A—3 tune is selected and played first. If that tune is followed by a blank section of tape at least 2.5 seconds in duration, playback mode is reverted to music search mode to select A—5. And if B—2 has been programmed after A—3 and A—5, the tape travel direction is reversed after playback of A—5 has been completed. Then following side B current tune designation, the B—2 tune is selected and played.

* Indicators and memory

When, for example, A—3, A—5, and B—2 are selected as in the previous example, the selection is commenced from side A, which means that the 3 and 5 indicators for side A will be on. Selection of A—3 is commenced after the current tune designation, then following completion of a program check, the 3 indicator starts to blink on and off. Playback of A—3 is followed by selection of A—5, and at this tims the A—3 data is cleared, the 3 indicator is turned off, and the 5 indicator starts to blink on and off. Likewise, after playback of A—5 has been completed, the A—5 data is cleared. And after side A has been completed, the tape travel direction is reversed, and the side B tunes are indicated. After completing the final side A step, the side B current tune designation operation is executed, followed by selection of B—2 and blinking of the 2 indicator. After B—2 has been played, the B—2 data is cleared and the 2 indicator is turned off. If no more programs have been programmed, the operation is stopped and the system is returned to NON mode with the transport modes keys set to deck I.

In programs where the same tune has been set for multiple selection (for example, step (1) A—2, (2) A—5, (3) A—2, (4) A—2 with A—2 being selected three times) the step (1) A—2 data is cleared, but the 2 indicator is not turned off.

* Key inputs during program execution

The only keys which can be used during programmed playback are STOP, MS+, and MS–.

STOP	Program playback is stopped, data is cleared, and the system is returned to NON mode with tape transport keys set to deck I.
MS+	Can only be used during actual playback in program playback mode (although the input is not accepted during the first 8 seconds of playback). This input results in selection of the tune in the next step of the program. The data of the step being played is cleared, the indicator is turned off, and the indicator for next tune starts to blink on and off.
MS–	This, too, can only be used during actual playback in program playback mode (although the input is not accepted during the first 8 seconds of playback). The tune currently being played is selected a second time, and the indicator continues to blink on and off without the data being cleared.

If an MS+ input is applied when at the last step of the program, the program playback mode is cancelled and tape transport is stopped.

* Leader end processing during the program

During program playback mode, if the I-LEAD input is switched to H level, LEADER input cannot be used irrespective reverse made setting.

* Sensing end processing during the program

If there is no sensing pulse input for at least 3 seconds when in cue mode during a music search operation, that is, when the end of the tape has been reached, not only is the auto stop mechanism activated, but the program playback mode is cancelled, all tune number data from the currently selected tune is cleared, and the tune number indicators are turned off. End processing from forward review or reverse cue mode results in the current position being reset, and the music search operation being continued.

* Program playback and reverse mode designation

During program input and program playback modes, music search and input operations in the deck I (the program playback deck) can be transferred from side A to side B irrespective of reverse mode settings.

* Program check function

If the RUN (START), DUBBING (NORMAL SPEED COPY), or X2 COPY (HIGH SPEED COPY) key is pressed during program input mode, the tape is changed to rewind mode if in forward direction, or to fast forward mode if in reverse direction due to execution of current tune number designation. If a key input is applied, the tune number indicators on the forward side blink on off in the selected sequence, and then the indicators on the reverse side blink on and off. At the same time, the deck I FWD and REV indicators indicate by blinking the side where the input program is located. The music search operations stops until this tune number indicator scanning has been completed.

(3) Program x1 copy mode

If the DUBBING key is pressed while the RUN (START), DUBBING (NORMAL SPEED COPY), and X2 COPY (HIGH SPEED COPY) indicators are blinking on and off following input of the program, deck I is put into program playback mode, the current tune address is set, and a music search operation is started. At the same time, deck II is put into recording pause mode. In the internal amplifier circuit, COPY SW is set to "H" level and II PB SW is set to "L" level, and the tune number indicator is the same as in program playback mode with the DUBBING (NORMAL SPEED COPY) indicator on. Following the music search operation in program playback mode, deck I is switched to playback mode at the same time that deck II is switched from recording pause mode to recording mode, resulting in copying from deck I to deck II. When a blank section of tape of at least 2.5 seconds in duration is detected in deck I, deck II is switched back to recording pause mode. Deck I restarts music search operation, copying being resumed after playback mode at the next tune is started. When deck I detects another blank section of tape at least 2.5 seconds long after copying the final step in the program, both decks are stopped and the program x1 copy mode is cancelled.

The only key which can be used during this copy mode is the STOP key. In addition to stopping both decks and cancelling the mode, the STOP key also clears the data.

The program x1 copy mode can be cancelled by a REC INH input applied to deck II, by satisfying the mode cancellation conditions by end processing in dubbing mode, or by satisfying the program playback mode cancelling conditions in deck I. The corresponding data is cleared when the mode is cancelled.

(4) Program x2 copy mode

If the X2 COPY key is pressed while the RUN (START), DUBBING (NORMAL SPEED COPY), and X2 COPY (HIGH SPEED COPY) indicators are blinking on and off following input of the program, both decks are changed to the same tape transport modes as in program x1 copy mode. But since the X2 COPY indicator is switched to "H" level, tape speed is set to a value twice as fast as the normal speed, resulting in deck I playback and deck II recording proceeding at twice the normal speed. This mode differs from the program X 1 copy mode in that deck I blank tape detection time is set to 1.25 seconds instead of 2.5 seconds.

Other conditions including key input conditions are the same as in program x1 copy mode.

12.3.13 Function Modes

Pressing the individual function keys after the decks have been reset results in the corresponding functions being set. These modes are summarized below.

(1) NON mode
- (2) Program input mode
  - (3) Program playback mode
  - (4) Program x1 copy mode
  - (5) Program x2 copy mode
- (6) Relay mode
- (7) BOTH REC (parallel recording) mode
- (8) Dubbing mode
- (9) x2 copy mode

(1) NON mode . . . Status where no mode has been set.

(2) Program input mode
. . . . . . Mode where basic transport mode keys are changed to numerical keys to anable program input.

(3) Program playback mode
. . . . . . Mode where program playback is executed.

(4) Program x 1 copy mode
. . . . . . Mode where deck I is in program playback mode, and deck II is in recording mode to copy the playback signal at normal speed.

(5) Program x2 copy mode
. . . . . . Mode where deck I is in program playback mode at double speed, and deck II is in recording mode to copy the playback signal at double speed.

(6) Relay mode
. . . . . . Recording and playback modes using the relay function.

(7) BOTH REC mode
. . . . . . Mode where deck I and deck II are both in recording mode.

(8) Dubbing mode
. . . . . . Mode where tape I is copied onto tape II at normal speed.

(9) x2 copy mode
. . . . . . Mode where tape I is copied onto tape II at double speed.

12.3.14 Mode Changes Diagram

See Figure 12-3-15.

12.3.15 Key Input Acceptance Conditions

The tape transpor modes which can exist at the same time in the two decks are shown iin Figure 12-3-16. If a key is pressed for a mode which cannot exist in a certain situation, that key input is not accepted, and no change is achieved. For example, if deck I is in playback mode and the deck II REC key is pressed to switch that deck to recording mode, no mode change occurs at all. Note, however, that even if the PLAY key input canont be accepted in one deck, it is possible for the input to result in the head direction being changed.

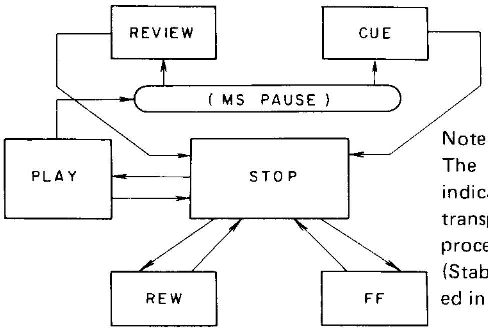
12.3.16 Function Key Input Acceptance Conditions

When a function key input is received, the corresponding function mode is started. Since there is basically no shift between function modes, function key inputs cannot be received once a function mode has been started. Function changes must usually be made by first switching to the NON mode. Use of the x1 and x2 copy functions during program input mode is an exception. Function key inputs cannot be accepted while a motor assist operation is being executed in either or both decks.

12.3.17 Conditions for Accepting Function Key Inputs in NON Mode

The BOTH REC and X2 COPY inputs can only be received when both decks are in stop mode. The PROGRAM input, too, requires both decks to be in stop mode for the basic transport mode keys to be changed to numerical keys 1 thru 10.

	Basic tape transport assist mode	Tape transport mode
FWD or REV	STOP	STOP, STOP/PAUSE, PLAY/PAUSE, REC/PAUSE
	FF	FF
	REW	REW
	PLAY	PLAY, REC
	CUE	CUE
	REVIEW	REVIEW


REVIEW
CUE
(MS PAUSE)
PLAY
STOP
REW
FF

Note:
The MS pause mode is indicated as a tape transport assist check process.
(Stability is not achieved in this mode.)

Fig. 12-3-17 Basic tape transport mode changes

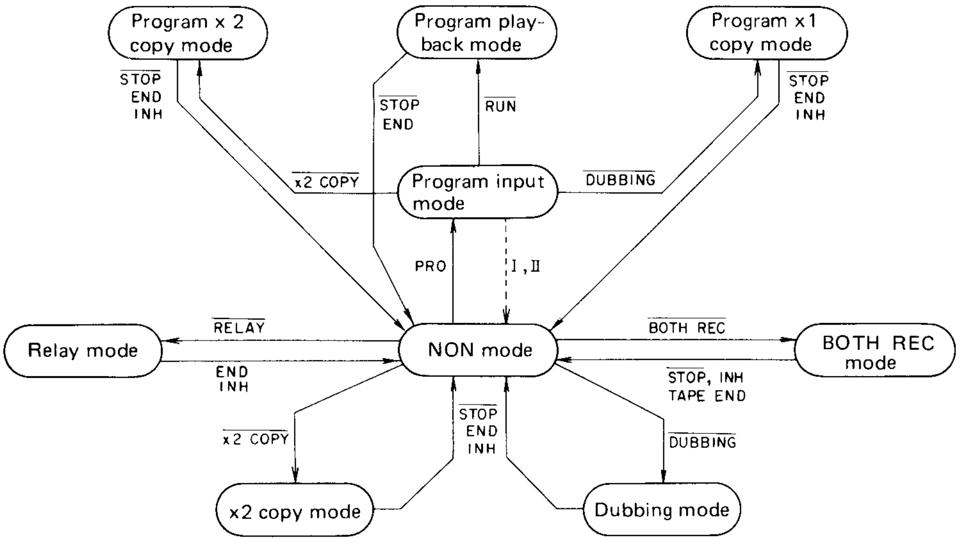

Program x 2 copy mode
Program playback mode
Program x1 copy mode
STOP
END
INH
STOP
END
RUN
STOP
END
INH
x2 COPY
Program input mode
DUBBING
PRO
I, II
RELAY
Relay mode
NON mode
BOTH REC
BOTH REC mode
END
INH
STOP, INH
TAPE END
x2 COPY
STOP
END
INH
DUBBING
x2 copy mode
Dubbing mode

Fig. 12-3-15 Mode changes diagram

12.3.18 Changes in Basic Tape Transport Modes

The tape transport modes shown in the tape transport assist timing chart are represented by the basic tape transport assist modes shown in Figure 12-3-17.

12.3.19 Motor Control Outputs

There are four control signals used in tape transport control in each deck. These are the AFWD and AREV outputs used in assist operations, and the RML and RMR reel motor drive signals.

		AFWD	
		H	L
AREV	H	STOP	REV
	L	FWD	STOP

		RML	
		H	L
RMR	H	STOP	FF
	L	REW	STOP

The drive direction of the control motors is determined by H and L combinations as shown in the above table. And during normal speed tape transport modes (forward playback, reverse playback, recording, and recording mute) the PLAY OUT output is synchronized with the reel motor output.

The x2 SIG output is at "H" level during x2 copy mode and program x2 copy mode.

Deck II / Deck I	STOP	STOP/ PAUSE	FF	REW	PLAY	PLAY/ PAUSE	REC	REC/ PAUSE	(REC MUTE)	CUE	REVIEW
STOP	○	○	○	○	○	○	○	○	○	○	○
STOP/PAUSE	○	╱	○	○	╱	╱	╱	╱	╱	╱	╱
FF	○	○	○	○	○	○	○	○	○	○	○
REW	○	○	○	○	○	○	○	○	○	○	○
PLAY	○	╱	○	○	╱	╱	*1	*2	*2	╱	╱
PLAY/PAUSE	○	╱	○	○	╱	╱	╱	╱	╱	╱	╱
REC	○	╱	○	○	╱	╱	*3	╱	╱	╱	╱
REC/PAUSE	○	╱	○	○	╱	╱	╱	*3	╱	╱	╱
(REC MUTE)	○	╱	○	○	╱	╱	╱	╱	*3	╱	╱
CUE	○	╱	○	○	╱	╱	╱	╱	╱	╱	╱
REVIEW	○	╱	○	○	╱	╱	╱	╱	╱	╱	╱
PROG. PLAY	○	╱	╱	╱	╱	╱	*1	╱	╱	╱	╱
PROG. CUE REVIEW	○	╱	╱	╱	╱	╱	╱	*1	╱	╱	╱

╱ : Impossible combination

*1 : Only during x1 or x2 copy mode.
*2 : Only during x1 copy mode.
*3 : Only when both decks are in recording mode.

Fig. 12-3-16 Tape transport mode combinations

12.3.20 Amplifier Control Outputs

The ports listed in Figure 12-3-18 are used as amplifier control outputs, and the amplifier control outputs in each mode are listed in Figure 12-3-20.

12.3.21 Indicator Outputs

The indicator outputs include DISP 1 thru 6, and the DUBBING, RUN, and X2 COPY indicators. Since DISP 1 thru 6 form a matrix with SEL A thru D, 24 different indicator outputs are possible. The indicator output matrix is shown in Figure 12-3-19.
(Respective indicators are turned on when SEL and DISP are both at "H" level.)

12.3.22 Initialized State When Power Is Switched On

The deck is put into stop mode for 4 seconds following release of RESET after the power is switched on. During this period, no key inputs are accepted at all. The control keys are set to deck I in NON mode where no other function key as been pressed.

Following the RESET release, FWD is in forward stop mode and REV is in reverse stop mode, irrespective of the encoder position at the RESET.

12.3.23 Processing When Power Is Switched Off

When a leading edge pulse signal is applied to the POWER OFF PULSE pin, tape transport is put into stop mode, and all key inputs are inhibited for 3 seconds. No matter what the tape transport mode may be, and "L" output is passed to $\overline{\text{LINE MUTE}}$, $\overline{\text{I—REC MUTE}}$, and $\overline{\text{II—REC MUTE}}$ as soon as the leading edge pulse input is applied to the POWER OFF PULSE pin. And at the same time that the indicator outputs are turned off, $\overline{\text{BIAS}}$ is set to H level, and the tape transport mechanism is put into stop mode.

The POWER OFF processing function has priority over the remote control signal processing function.

12.3.24 Processing When An Assist Error Is Generated

If the prescribed mode is not achieved within 4 seconds after the tape transport assist operation is commenced, the deck is returned to stop mode. And if stop mode is not achieved within 4 seconds after that, all outputs are turned off in the same sequence and timing as when a STOP input is applied.

Port Name	ACTIVE	Description
$\overline{\text{BIAS}}$	L	BIAS OSC control ON : L
BOTH REC	H	BOTH REC mode signal
$\overline{\text{I—REC SW}}$	L	Deck I REC switching signal
$\overline{\text{II—REC SW}}$	L	Deck II REC switching signal
II—PB SW	H	I/II PB amplifier switching signal I—PB : L
DOLBY REC	H	COPY mode : L, other recording modes : H
$\overline{\text{I—REC MUTE}}$	L	Deck I recording mute mode : L
$\overline{\text{II—REC MUTE}}$	L	Deck II recording mute mode : L
$\overline{\text{LINE MUTE}}$	L	Line mute control
COPY SW	H	Copy mode : H
X2 SIG	H	x2 copy mode : H

Fig. 12-3-18 Amplifier system control outputs

	SEL A	SEL B	SEL C	SEL D
DISP 1	I ▷	II ▷	2	4
DISP 2	I ◁	II ◁	9	5
DISP 3	I PLAY	II PLAY	10	6
DISP 4	I REC	II REC	BOTH REC	7
DISP 5	I	II	*SKIP	8
DISP 6	PROGRAM	RELAY	1	3

* Not used in this model.

Fig. 12-3-19 Indicator output matrix

12.3.25 Prevention of Encoder Chattering

To prevent encoder chattering, encoder inputs are checked a second time after the tape transport assist operation has been completed.

12.3.26 Definition of End of Assist Operation

Completion of tape transport assist operation is defined as the start timing of the final electromagnetic brake in the assit motor.

	Deck I	Deck II	II PB SW	$\overline{\text{I REC SW}}$	$\overline{\text{II REC SW}}$	BOTH REC	DOL.REC	COPY SW	$\overline{\text{BIAS}}$	$\overline{\text{LINE MUTE}}$	$\overline{\text{I REC MUTE}}$	$\overline{\text{II REC MUTE}}$
NON	STOP, FF, REW	STOP, FF, REW, CUE, REVIEW, STOP/PAUSE, PLAY/PAUSE	H	H	H	L	L	L	H	L	L	L
		PLAY	H	H	H	L	L	L	H	H	L	L
		REC	H	H	L	L	H	L	L	H	L	H
		REC/PAUSE, REC MUTE	H	H	L	L	H	L	L	H	L	L
	STOP/PAUSE, CUE, REVIEW PLAY/PAUSE	STOP, FF REW	L	H	H	L	L	L	H	L	L	L
	PLAY		L	H	H	L	L	L	H	H	L	L
	REC		H	L	H	L	H	L	L	H	H	L
	REC/PAUSE REC MUTE		H	L	H	L	H	L	L	H	L	L
BOTH REC	REC	REC	H	L	L	H	H	L	L	H	H	H
	REC/PAUSE	REC/PAUSE	H	L	L	H	H	L	L	H	L	L
	REC MUTE	REC MUTE	H	L	L	H	H	L	L	H	L	L
x1, x2 COPY	PLAY	REC	L	H	L	L	L	H	L	H	L	H
		REC/PAUSE, REC MUTE	L	H	L	L	L	H	L	H	L	L

Fig. 12-3-20 Tape transport modes and corresponding control outputs

12.3.27 Timing During Function Modes

(1) The timing for switching the bias off in parallel recording mode follows completion of the assist operations in both decks.

(2) The timing for switching the bias off in dubbing and x2 copy modes follows completion of the assist operation in deck II.

(3) If assist operations are executed simultaneously in both decks, the timing setting of mute signal and amplifier switching SW follows completion of the assist operations in both decks.

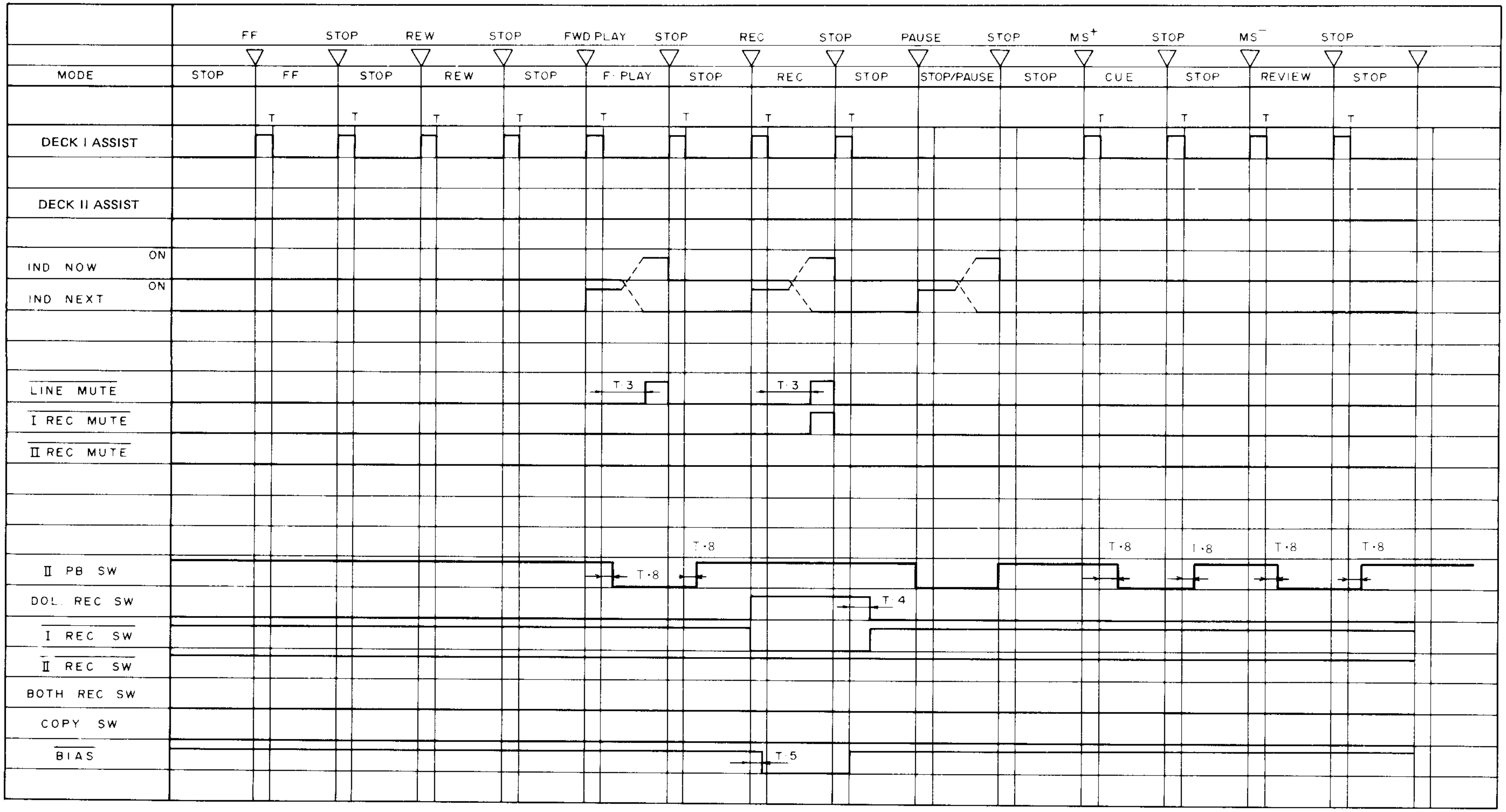
(4) The initialized timing for space mute in parallel recording mode also follows completion of the assist operations in both decks.

(5) The timing for switching from deck I to II and deck II to I in relay mode is determined according to the timing chart described later.

12.3.28 REC Key and End Processing

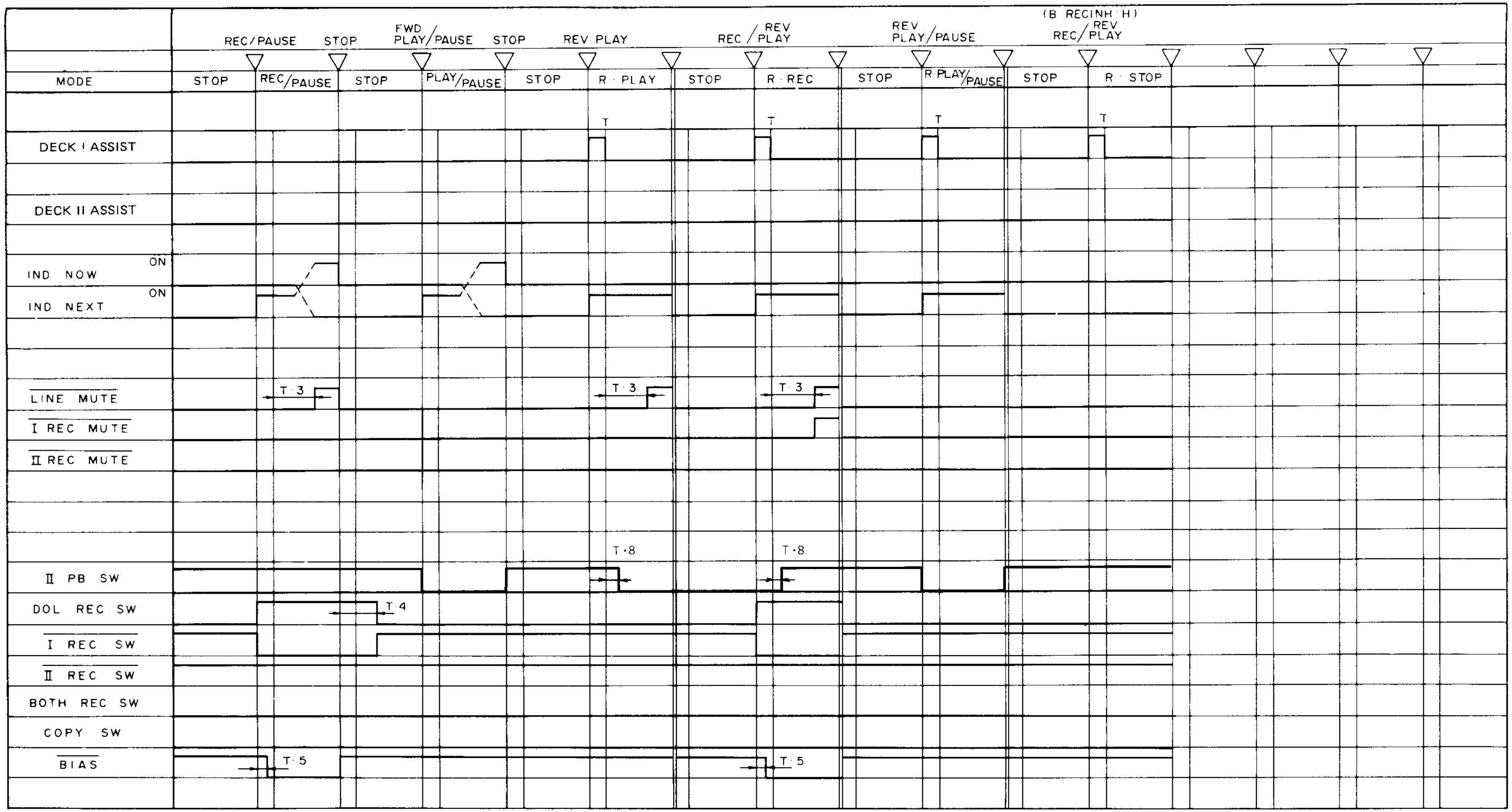
Even in endless mode, tape direction cannot be reversed during the end processing by keeping the $\overline{\text{REC}}$ key depressed in forward recording mode.

12.4 PD3031A CONTROL TIMING CHARTS


FF
STOP
REW
STOP
FWD PLAY
STOP
REC
STOP
PAUSE
STOP
MS⁺
STOP
MS⁻
STOP
MODE
STOP
FF
STOP
REW
STOP
F. PLAY
STOP
REC
STOP
STOP/PAUSE
STOP
CUE
STOP
REVIEW
STOP
T
DECK I ASSIST
DECK II ASSIST
IND NOW
ON
IND NEXT
ON
LINE MUTE
I REC MUTE
II REC MUTE
T·3
II PB SW
DOL. REC SW
I REC SW
II REC SW
BOTH REC SW
COPY SW
BIAS
T·8
T·4
T·5

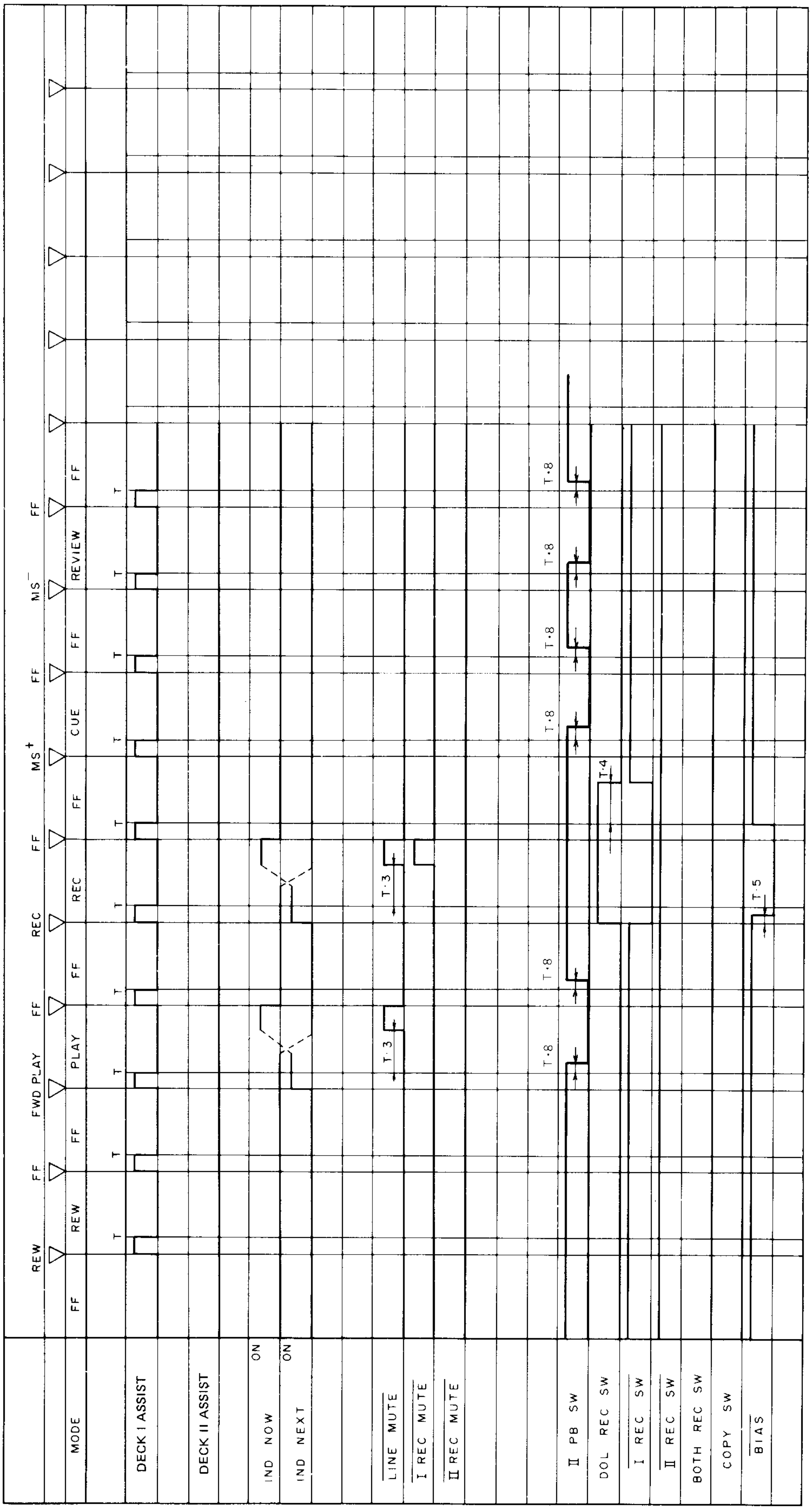
TIMING (mS)

T·1		T·8	30
T·2		T·9	
T·3	250	T·10	
T·4	60	T·11	
T·5	40	T·12	
T·6		T·13	
T·7		T·14	


REC/PAUSE
STOP
FWD PLAY/PAUSE
STOP
REV PLAY
REC/REV PLAY
REV PLAY/PAUSE
(B RECINH H)
REC/REV PLAY
MODE
STOP
REC/PAUSE
STOP
PLAY/PAUSE
STOP
R · PLAY
STOP
R · REC
STOP
R PLAY/PAUSE
STOP
R · STOP
T
DECK I ASSIST
DECK II ASSIST
IND NOW
ON
IND NEXT
ON
LINE MUTE
I REC MUTE
II REC MUTE
T 3
T·8
II PB SW
DOL REC SW
T 4
I REC SW
II REC SW
BOTH REC SW
COPY SW
BIAS
T 5

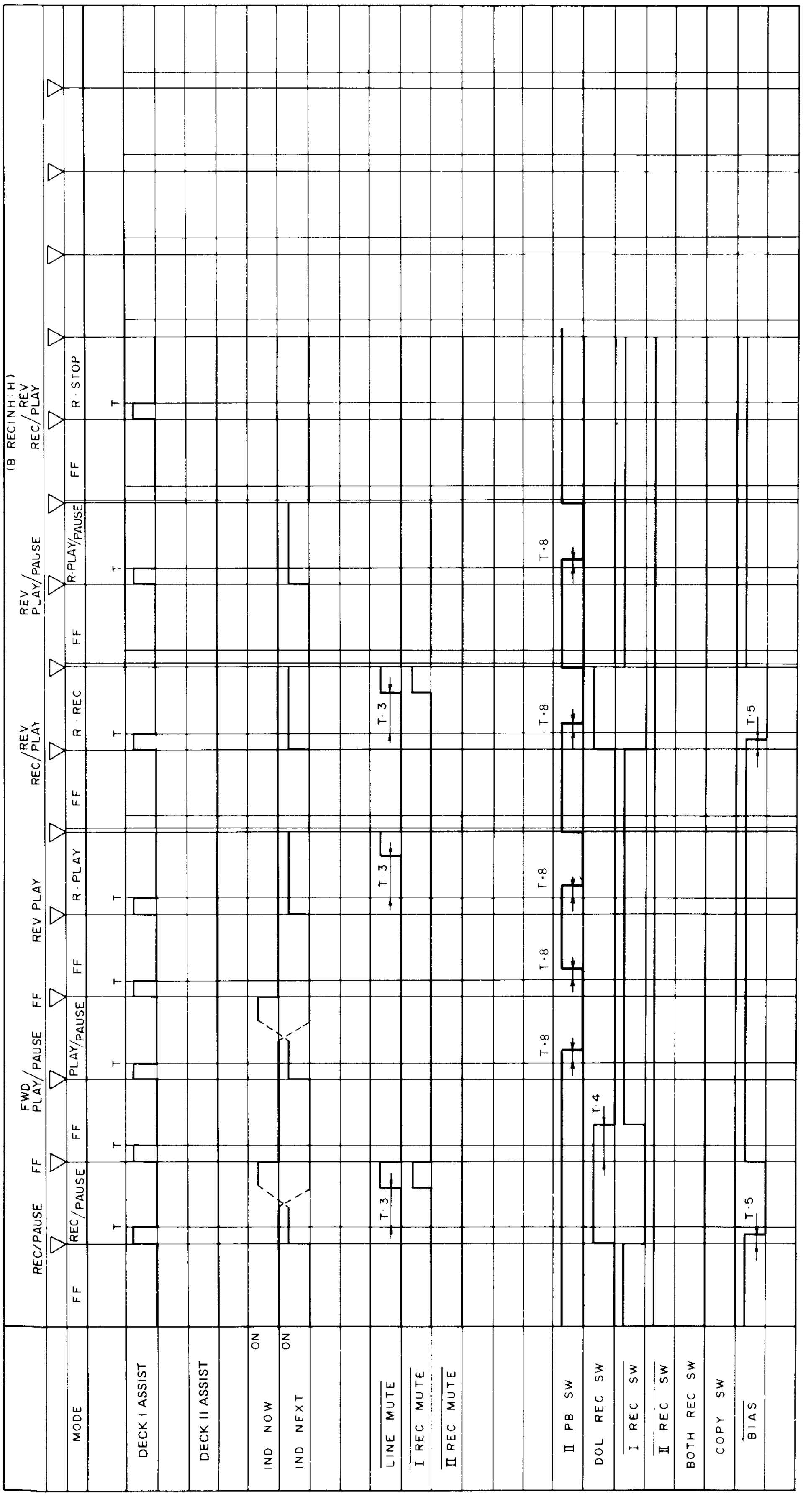
TIMING (mS)

T·1		T·8	30
T·2		T·9	
T·3	250	T·10	
T·4	60	T·11	
T·5	40	T·12	
T·6		T·13	
T·7		T·14	


MODE
FF
REW
FF
FWD PLAY
PLAY
REC
MS+
CUE
MS−
REVIEW
DECK I ASSIST
DECK II ASSIST
IND NOW
ON
IND NEXT
ON
LINE MUTE
I REC MUTE
II REC MUTE
II PB SW
DOL REC SW
I REC SW
II REC SW
BOTH REC SW
COPY SW
BIAS
T
T·3
T·4
T·5
T·8

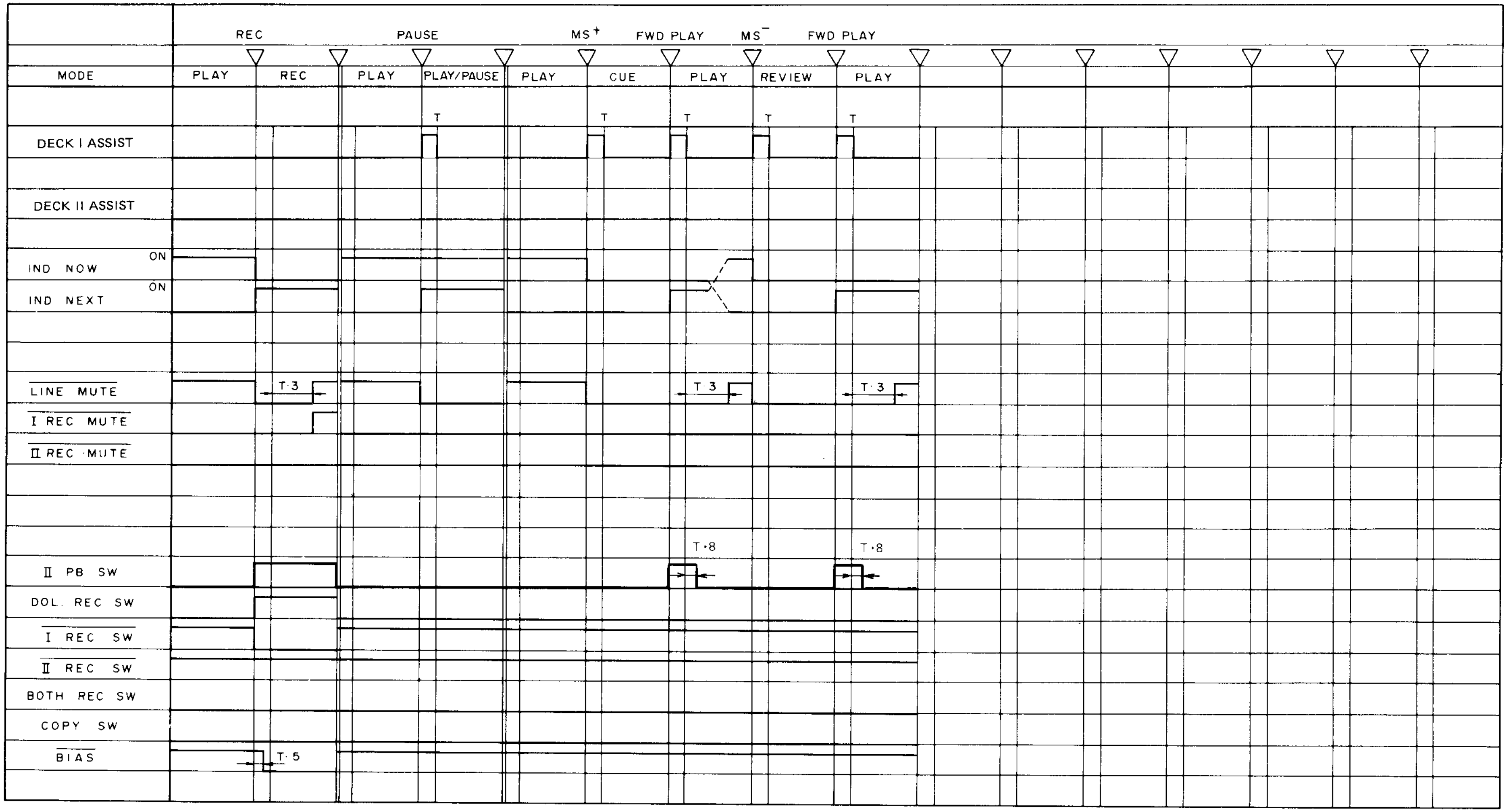
TIMING (mS)

T·1		T·8	30
T·2		T·9	
T·3	250	T·10	
T·4	60	T·11	
T·5	40	T·12	
T·6		T·13	
T·7		T·14	


MODE
FF
REC/PAUSE
REC/PAUSE
FF
FF
FWD PLAY/PAUSE
PLAY/PAUSE
FF
FF
REV PLAY
R·PLAY
FF
REC/REV REC/PLAY
R·REC
FF
REV PLAY/PAUSE
R PLAY/PAUSE
FF
(B REC INH:H) REC/PLAY REV
R·STOP
DECK I ASSIST
DECK II ASSIST
IND NOW
ON
IND NEXT
ON
LINE MUTE
I REC MUTE
II REC MUTE
II PB SW
DOL REC SW
I REC SW
II REC SW
BOTH REC SW
COPY SW
BIAS
T
T·3
T·4
T·5
T·8

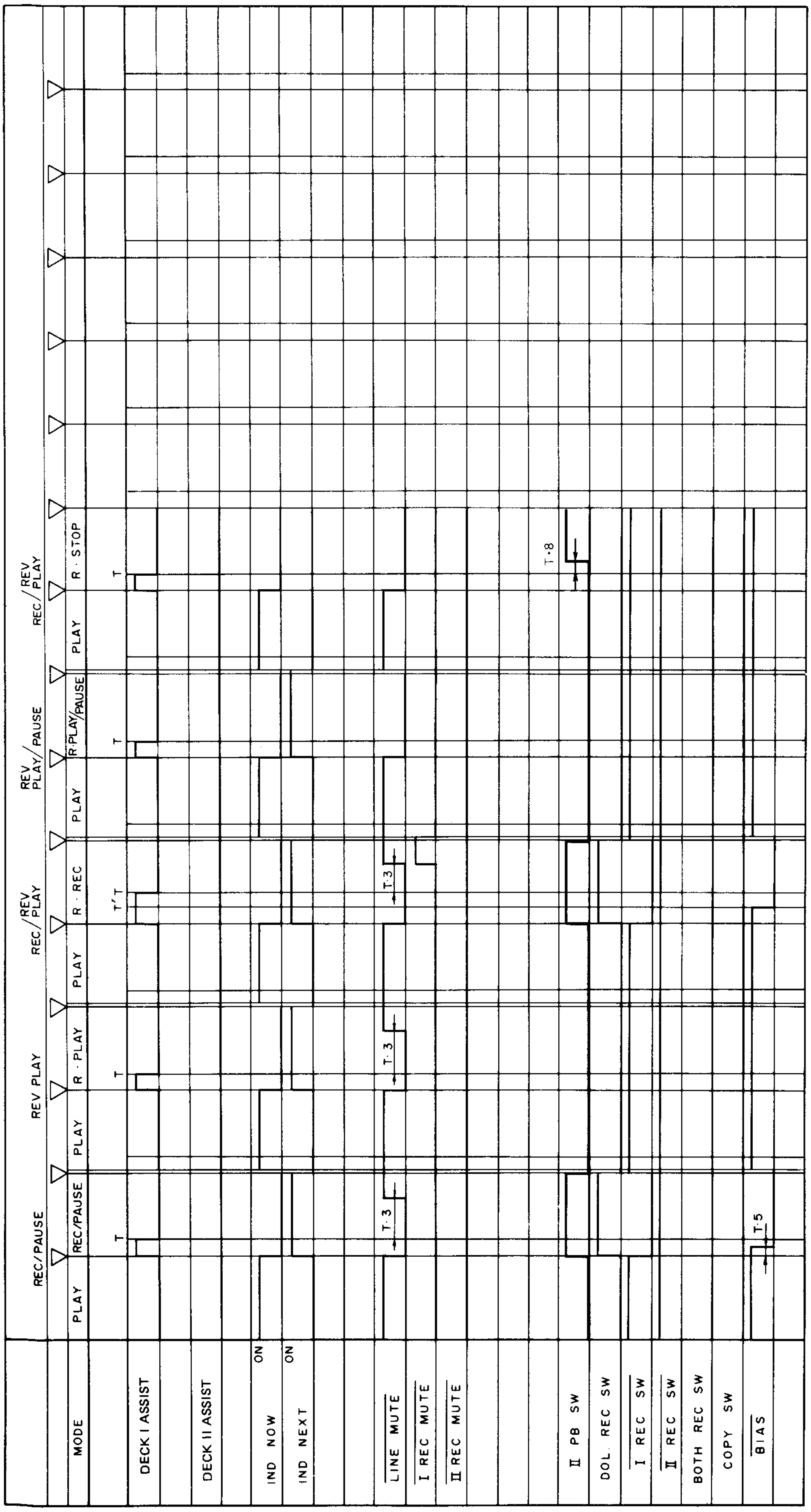
TIMING (mS)

T 1		T 8	30
T 2		T 9	
T 3	250	T 10	
T 4	60	T 11	
T 5	40	T 12	
T 6		T 13	
T 7		T 14	


REC
PAUSE
MS+
FWD PLAY
MS−
FWD PLAY
MODE
PLAY
REC
PLAY
PLAY/PAUSE
PLAY
CUE
PLAY
REVIEW
PLAY
T
DECK I ASSIST
DECK II ASSIST
IND NOW
ON
IND NEXT
ON
LINE MUTE
I REC MUTE
II REC MUTE
T·3
T·8
II PB SW
DOL. REC SW
I REC SW
II REC SW
BOTH REC SW
COPY SW
BIAS
T·5

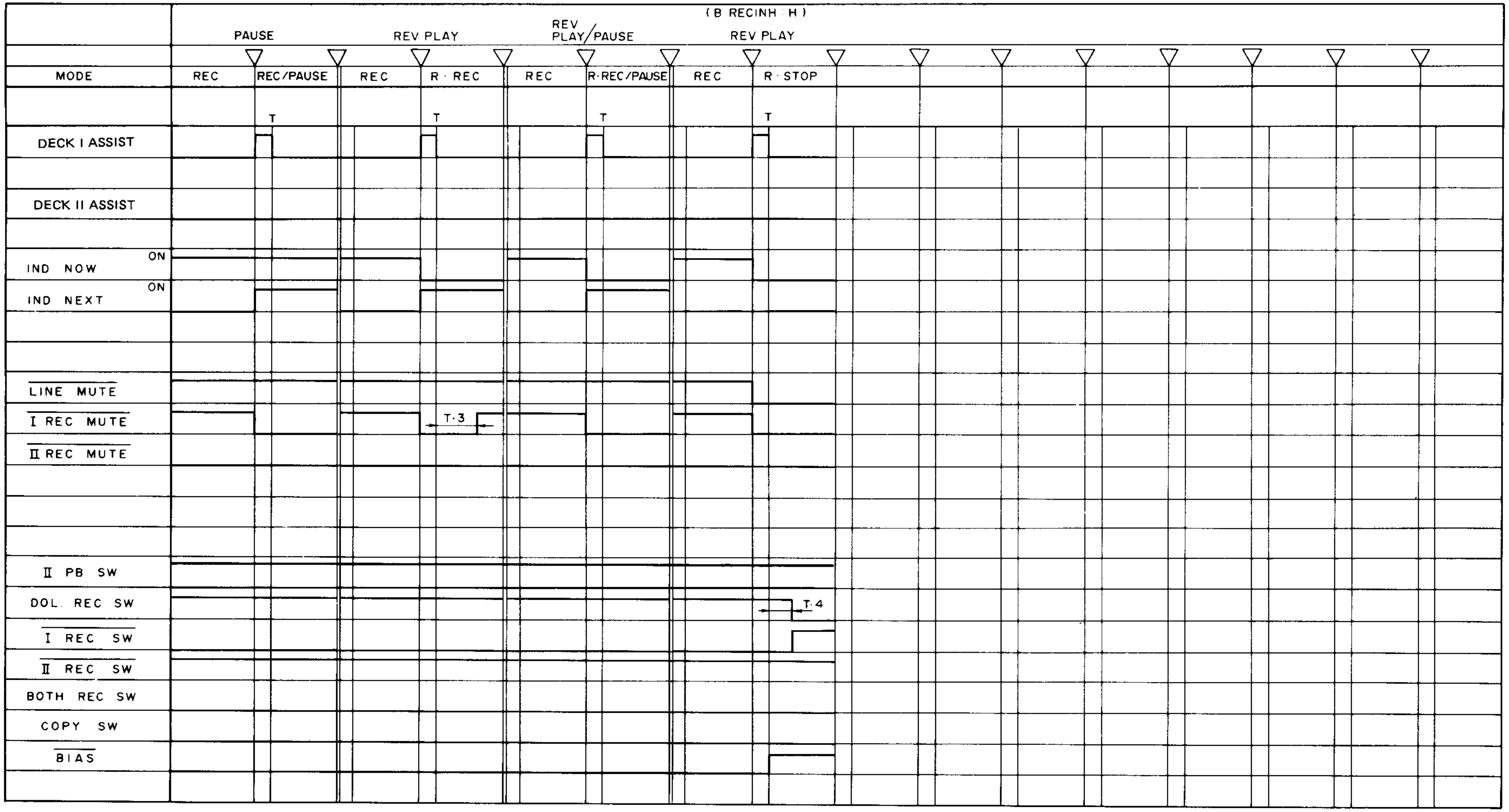
TIMING (mS)

T·1		T·8	30
T·2		T·9	
T·3	250	T·10	
T·4		T·11	
T·5	40	T·12	
T·6		T·13	
T·7		T·14	


MODE
PLAY
REC/PAUSE
REC/PAUSE
PLAY
REV PLAY
R · PLAY
PLAY
REC/REV PLAY
R · REC
PLAY
REV PLAY/PAUSE
R·PLAY/PAUSE
PLAY
REC/REV PLAY
R · STOP
T
T' T
T·3
T·5
T·8
DECK I ASSIST
DECK II ASSIST
IND NOW
ON
IND NEXT
ON
LINE MUTE
I REC MUTE
II REC MUTE
II PB SW
DOL REC SW
I REC SW
II REC SW
BOTH REC SW
COPY SW
BIAS

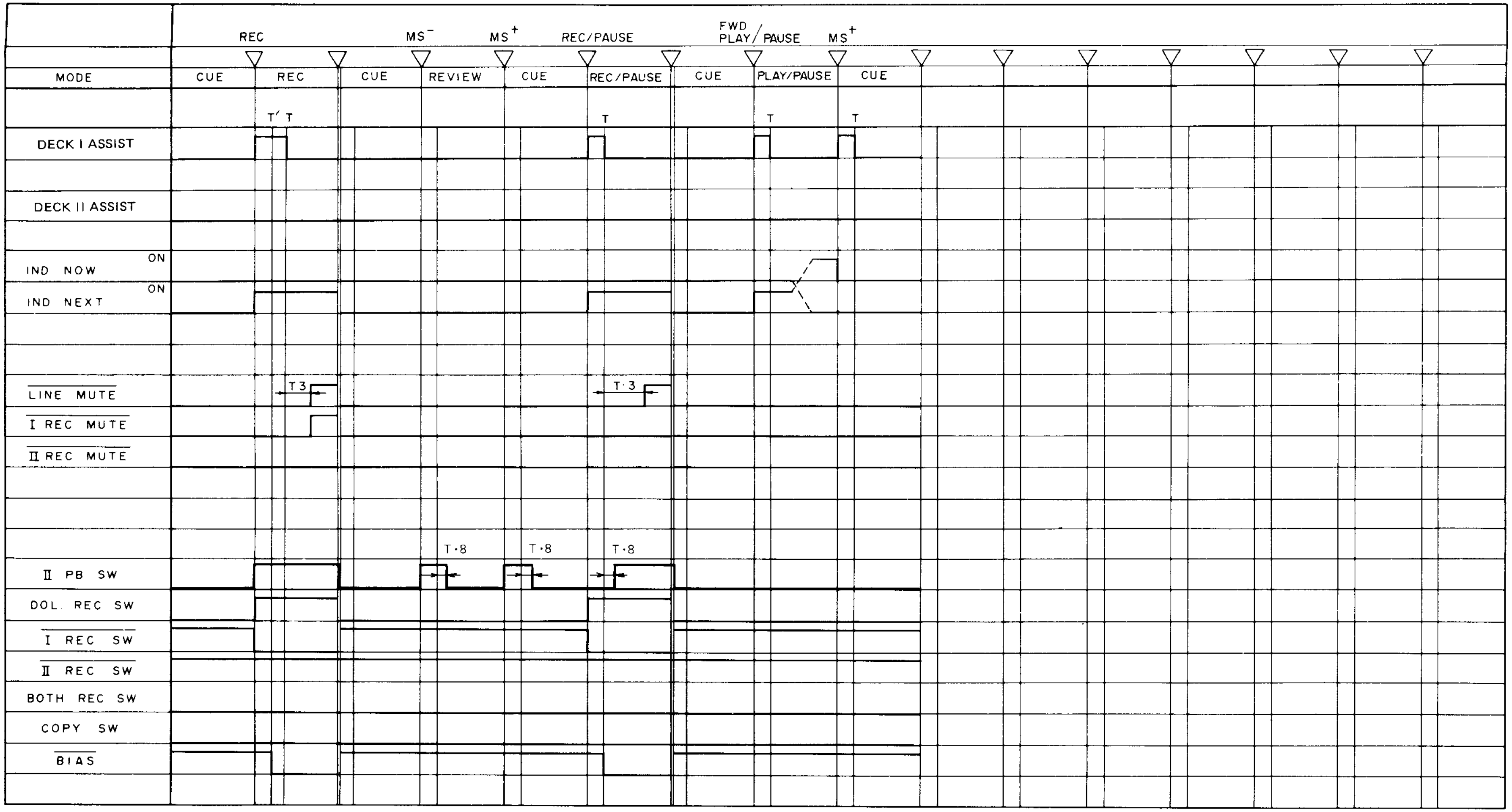
TIMING (mS)

T·1		T·8	30
T·2		T·9	
T·3	250	T·10	
T·4		T·11	
T·5	40	T·12	
T·6		T·13	
T·7		T·14	


PAUSE
REV PLAY
REV PLAY/PAUSE
(B RECINH H)
REV PLAY
MODE
REC
REC/PAUSE
REC
R · REC
REC
R·REC/PAUSE
REC
R · STOP
T
T
T
T
DECK I ASSIST
DECK II ASSIST
IND NOW
ON
IND NEXT
ON
LINE MUTE
I REC MUTE
II REC MUTE
T·3
II PB SW
DOL. REC SW
T·4
I REC SW
II REC SW
BOTH REC SW
COPY SW
BIAS

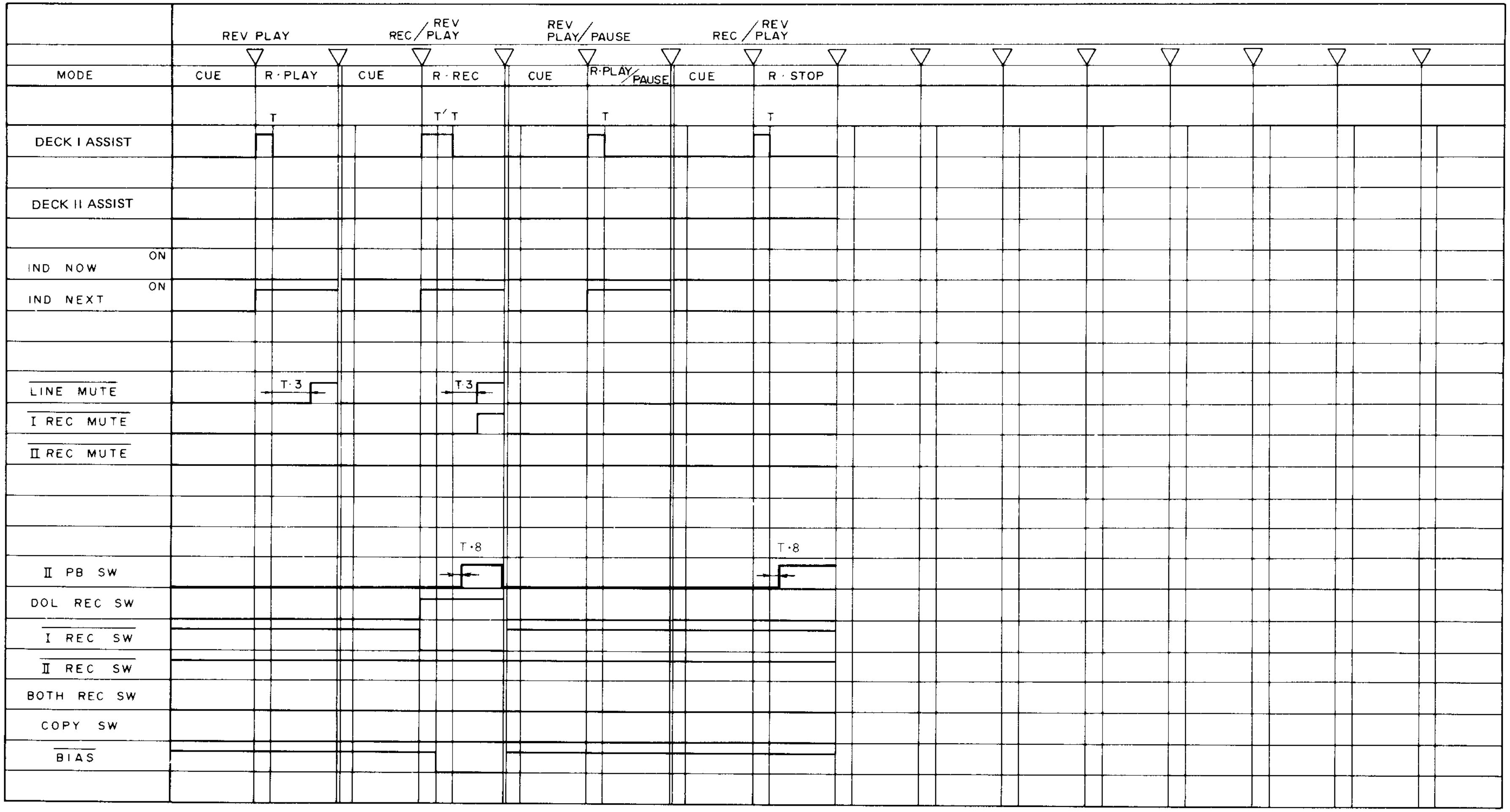
TIMING (mS)

T·1		T·8	
T·2		T·9	
T·3	250	T·10	
T·4	60	T·11	
T·5		T·12	
T·6		T·13	
T·7		T·14	


REC
MS⁻
MS⁺
REC/PAUSE
FWD PLAY/PAUSE
MS⁺
MODE
CUE
REC
CUE
REVIEW
CUE
REC/PAUSE
CUE
PLAY/PAUSE
CUE
T′ T
T
T
T
DECK I ASSIST
DECK II ASSIST
IND NOW
ON
IND NEXT
ON
LINE MUTE
I REC MUTE
II REC MUTE
T3
T·3
II PB SW
T·8
T·8
T·8
DOL. REC SW
I REC SW
II REC SW
BOTH REC SW
COPY SW
BIAS

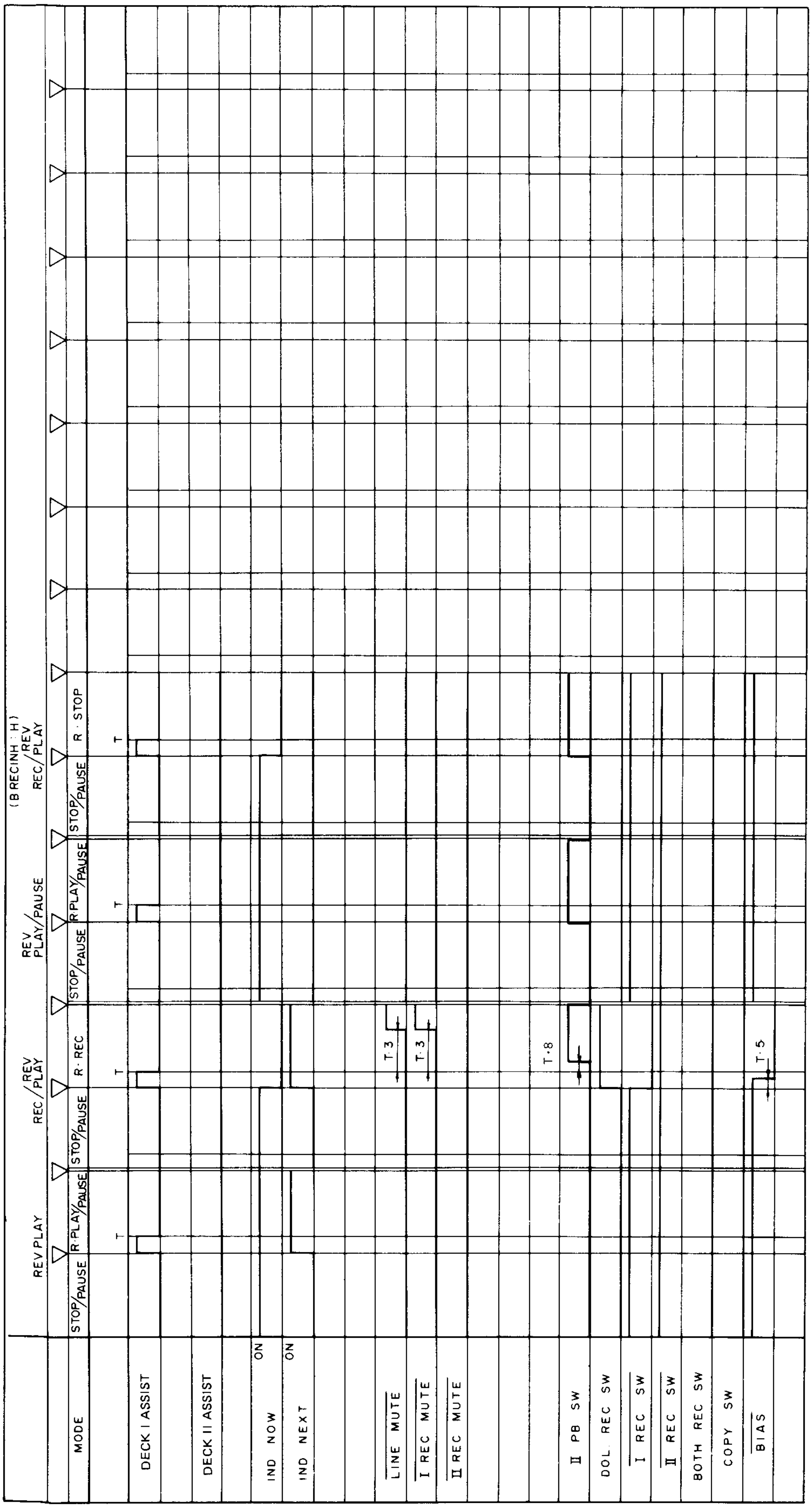
TIMING (mS)

T 1		T·8	30
T·2		T·9	
T·3	250	T·10	
T·4		T·11	
T·5		T·12	
T·6		T·13	
T·7		T·14	


REV PLAY
REC/REV PLAY
REV PLAY/PAUSE
REC/REV PLAY
MODE
CUE
R·PLAY
CUE
R·REC
CUE
R·PLAY/PAUSE
CUE
R·STOP
T
T′ T
T
T
DECK I ASSIST
DECK II ASSIST
IND NOW
ON
IND NEXT
ON
LINE MUTE
T·3
T·3
I REC MUTE
II REC MUTE
T·8
T·8
II PB SW
DOL REC SW
I REC SW
II REC SW
BOTH REC SW
COPY SW
BIAS

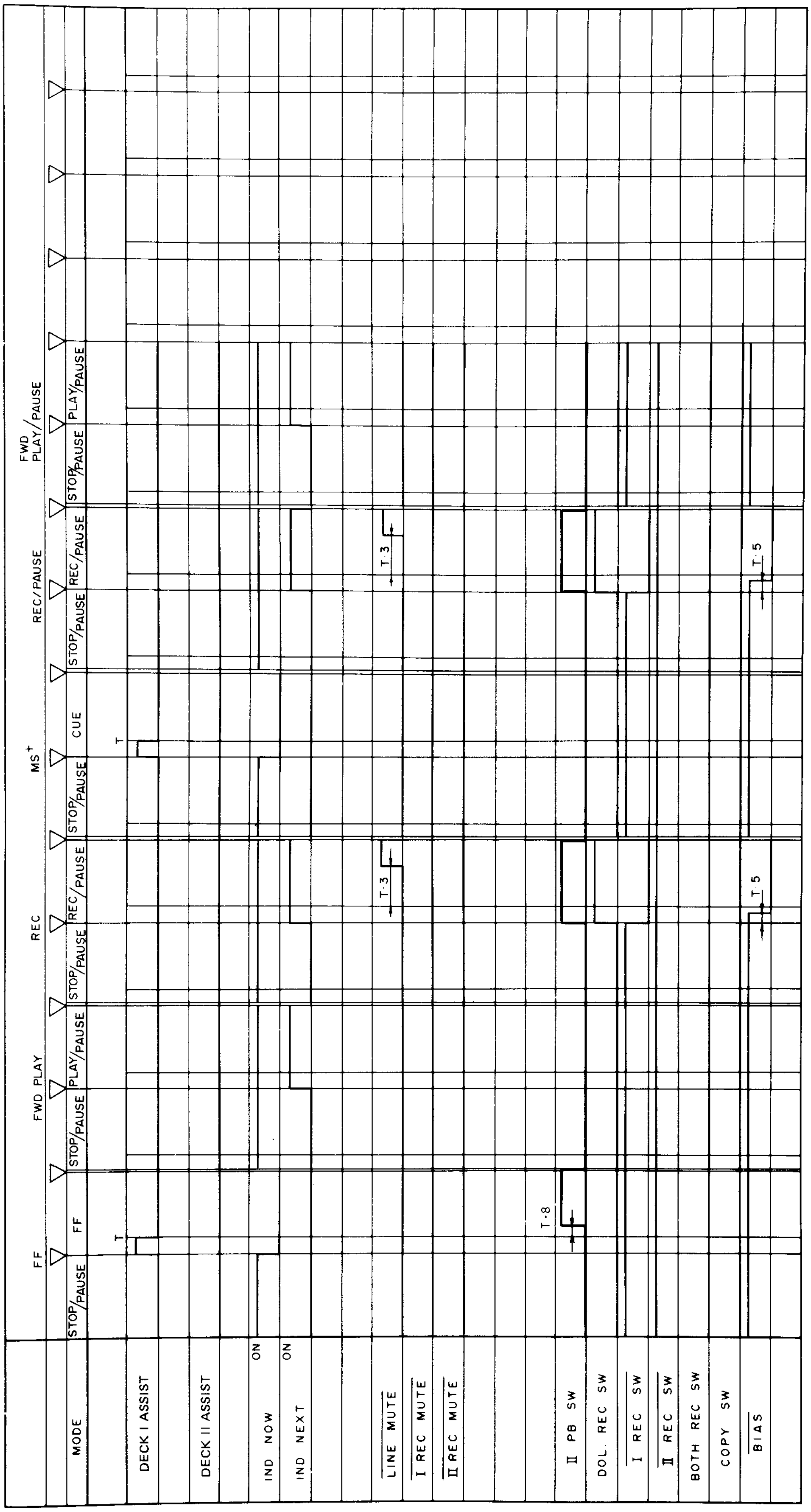
TIMING (mS)

T·1		T·8	30
T·2		T·9	
T·3	250	T·10	
T·4		T·11	
T·5		T·12	
T·6		T·13	
T·7		T·14	


MODE
STOP/PAUSE
REV PLAY
R PLAY/PAUSE
STOP/PAUSE
REC/REV PLAY
R·REC
STOP/PAUSE
REV PLAY/PAUSE
R PLAY/PAUSE
STOP/PAUSE
(B RECINH: H)
REC/REV PLAY
R·STOP
DECK I ASSIST
DECK II ASSIST
IND NOW
ON
IND NEXT
ON
LINE MUTE
I REC MUTE
II REC MUTE
II PB SW
DOL REC SW
I REC SW
II REC SW
BOTH REC SW
COPY SW
BIAS
T
T·3
T·8
T·5

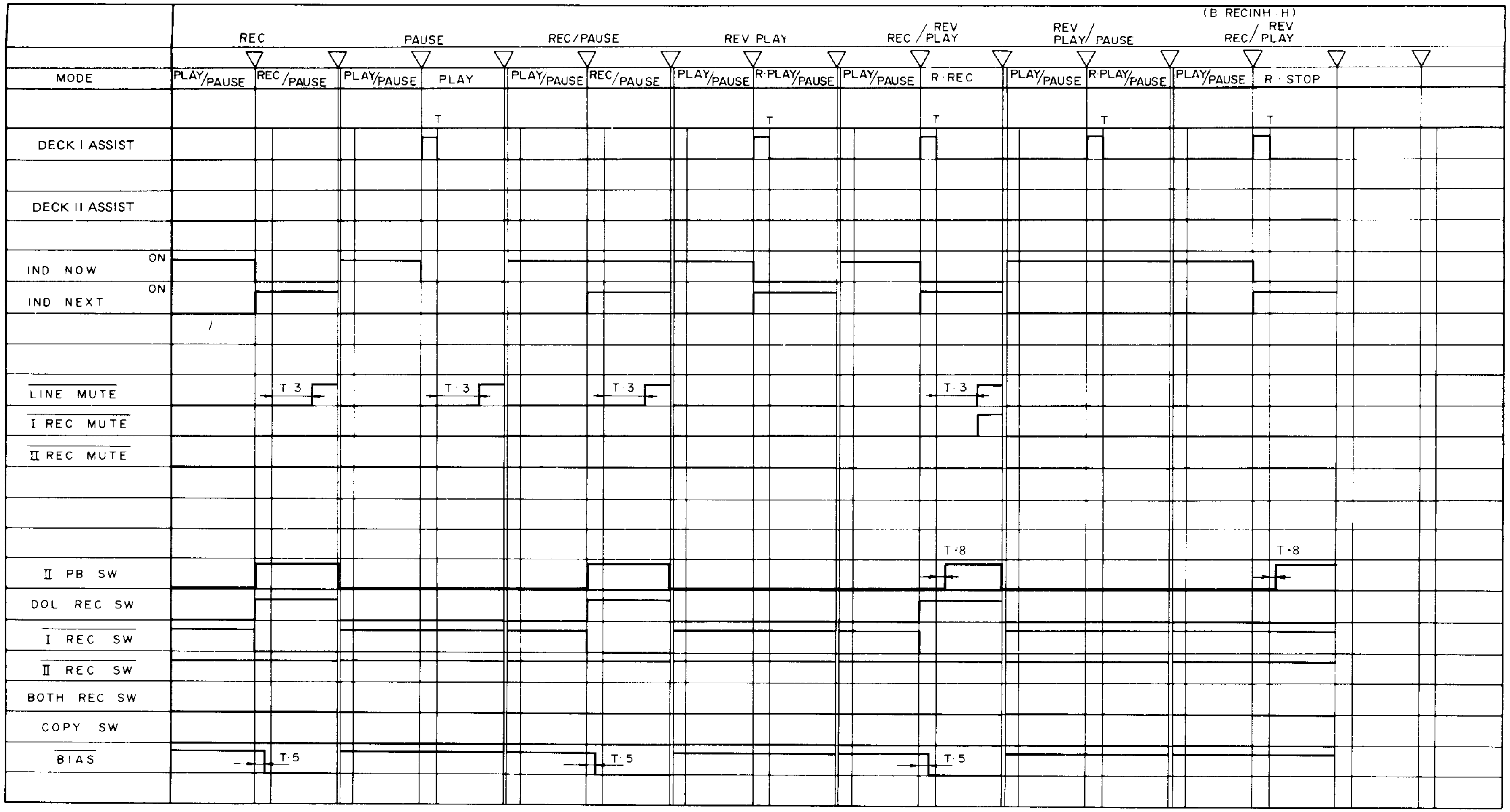
TIMING (mS)

T·1		T·8	30
T·2		T·9	
T·3	250	T·10	
T·4		T·11	
T·5	40	T·12	
T·6		T·13	
T·7		T·14	


MODE
STOP/PAUSE
FF
FF
FWD PLAY
STOP/PAUSE
PLAY/PAUSE
REC
STOP/PAUSE
REC/PAUSE
MS+
STOP/PAUSE
CUE
REC/PAUSE
STOP/PAUSE
REC/PAUSE
FWD PLAY/PAUSE
STOP/PAUSE
PLAY/PAUSE
DECK I ASSIST
DECK II ASSIST
IND NOW
ON
IND NEXT
ON
LINE MUTE
I REC MUTE
II REC MUTE
II PB SW
DOL. REC SW
I REC SW
II REC SW
BOTH REC SW
COPY SW
BIAS
T
T·8
T·3
T·5
T
T·3
T·5

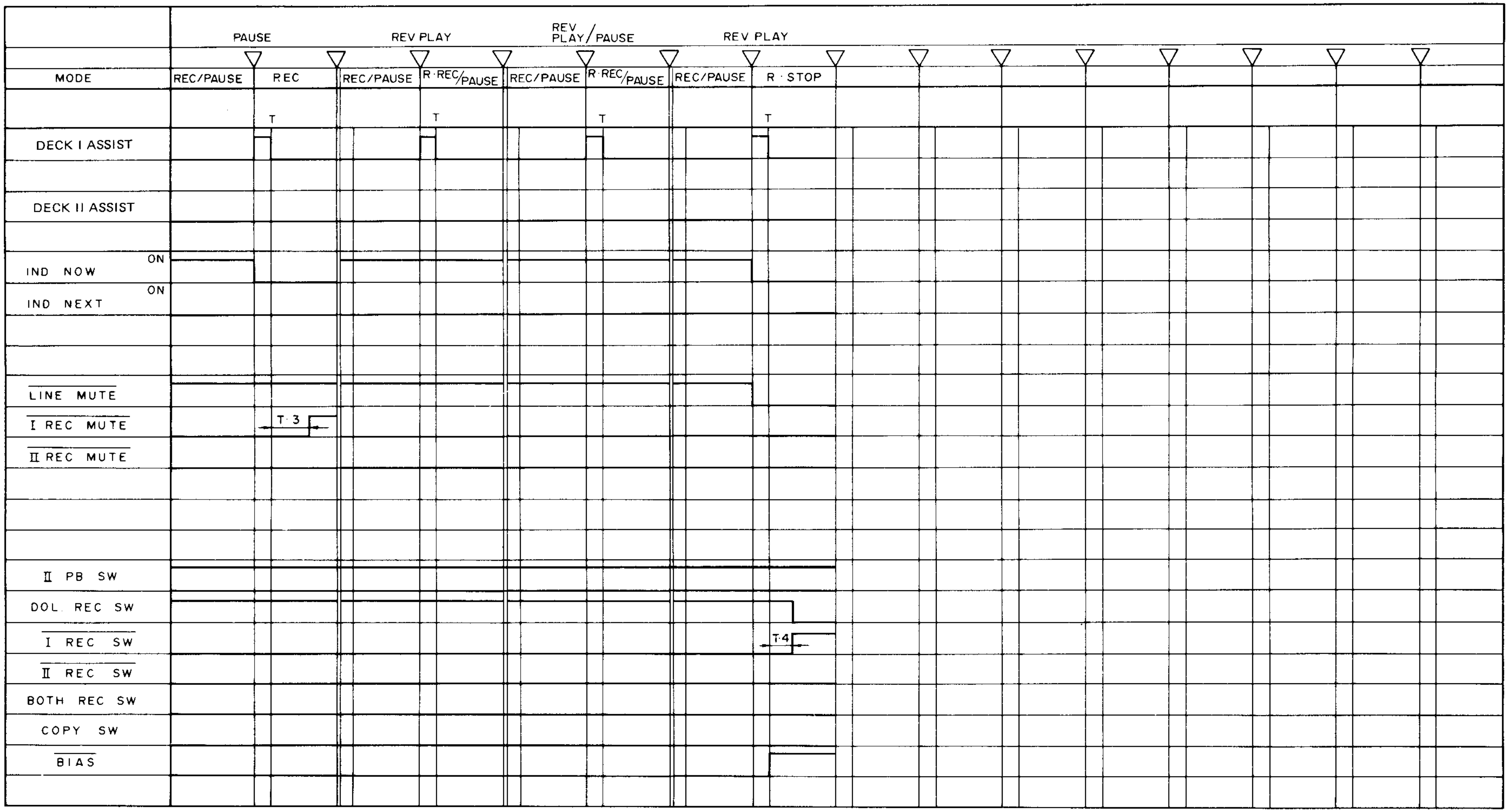
TIMING (mS)

T 1		T 8	30
T 2		T 9	
T 3	250	T 10	
T 4		T 11	
T 5	40	T 12	
T 6		T 13	
T 7		T 14	


REC
PAUSE
REC/PAUSE
REV PLAY
REC / REV PLAY
REV / PLAY / PAUSE
(B RECINH H)
REC / REV PLAY
MODE
PLAY/PAUSE
REC/PAUSE
PLAY/PAUSE
PLAY
PLAY/PAUSE
REC/PAUSE
PLAY/PAUSE
R·PLAY/PAUSE
PLAY/PAUSE
R·REC
PLAY/PAUSE
R·PLAY/PAUSE
PLAY/PAUSE
R·STOP
T
DECK I ASSIST
DECK II ASSIST
IND NOW
ON
IND NEXT
ON
LINE MUTE
I REC MUTE
II REC MUTE
T·3
T·8
II PB SW
DOL REC SW
I REC SW
II REC SW
BOTH REC SW
COPY SW
BIAS
T·5

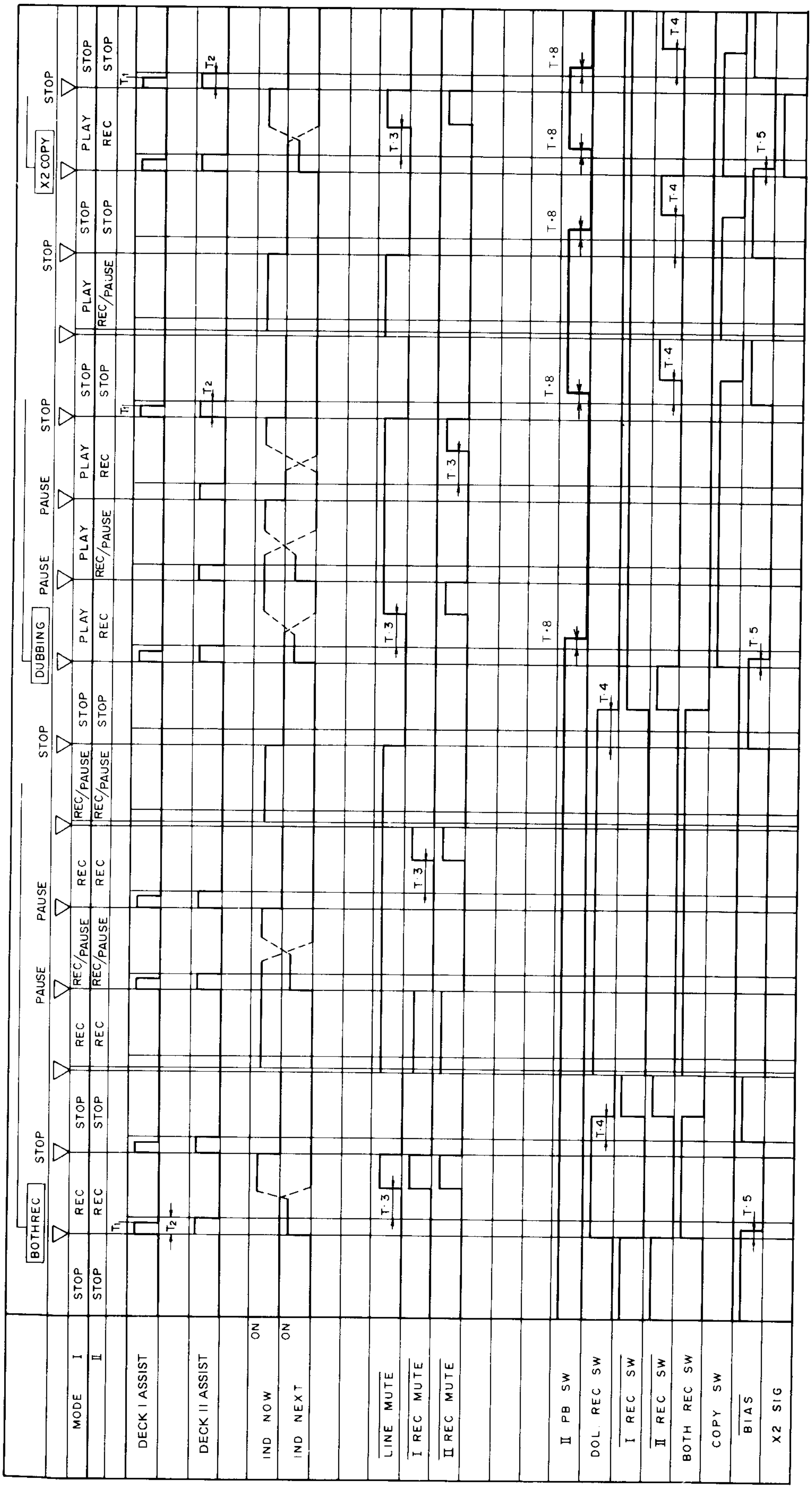
TIMING (mS)

T·1		T·8	30
T·2		T·9	
T·3	250	T·10	
T·4		T·11	
T·5	40	T·12	
T·6		T·13	
T·7		T·14	


PAUSE
REV PLAY
REV PLAY/PAUSE
REV PLAY
MODE
REC/PAUSE
REC
REC/PAUSE
R·REC/PAUSE
REC/PAUSE
R·REC/PAUSE
REC/PAUSE
R·STOP
T
T
T
T
DECK I ASSIST
DECK II ASSIST
IND NOW
ON
IND NEXT
ON
LINE MUTE
I REC MUTE
II REC MUTE
T·3
II PB SW
DOL REC SW
I REC SW
II REC SW
T·4
BOTH REC SW
COPY SW
BIAS

TIMING (mS)

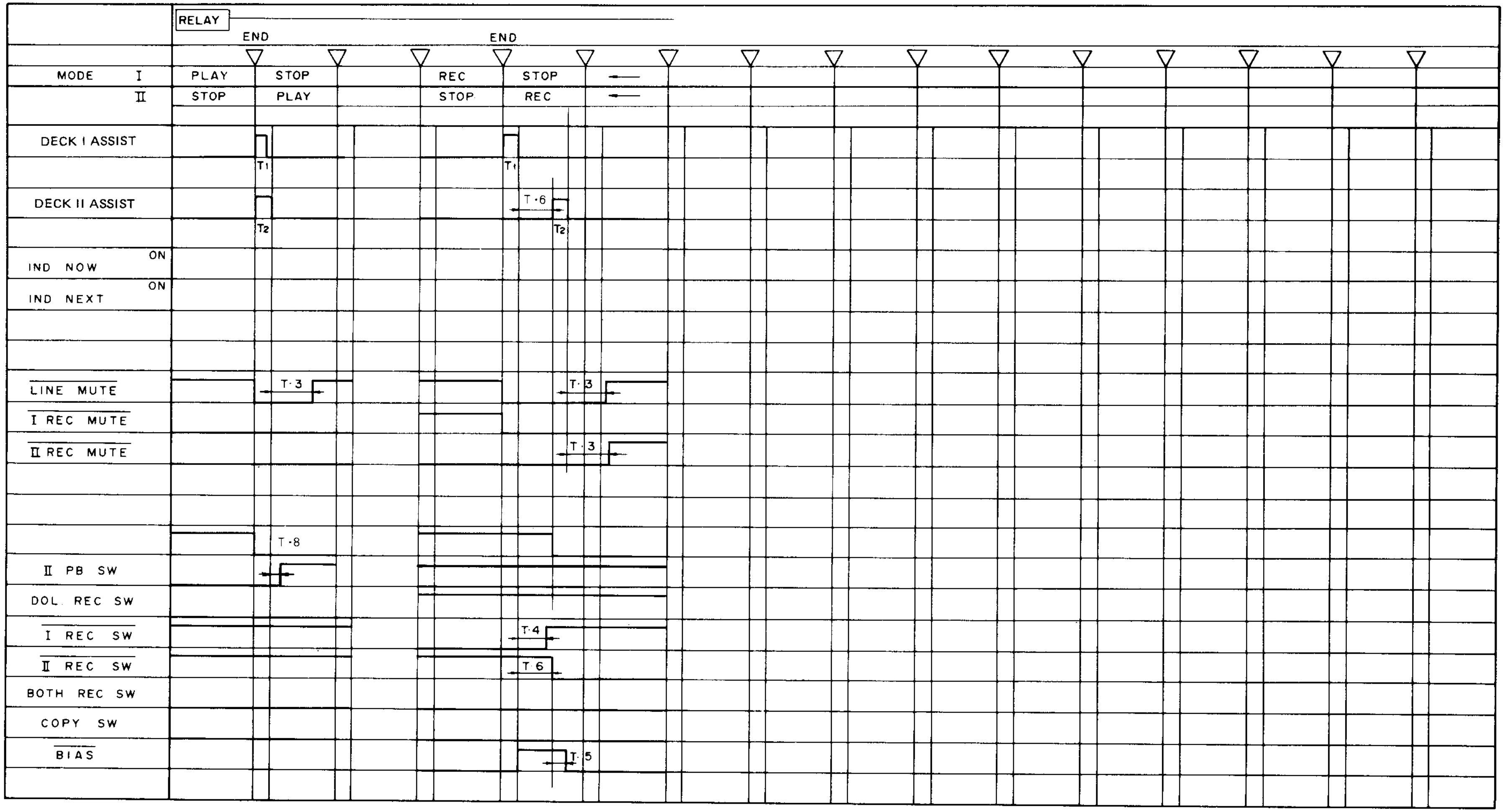
T·1		T·8	
T·2		T·9	
T·3	250	T·10	
T·4	60	T·11	
T·5		T·12	
T·6		T·13	
T·7		T·14	


MODE I
II
DECK I ASSIST
DECK II ASSIST
IND NOW ON
IND NEXT ON
LINE MUTE
I REC MUTE
II REC MUTE
II PB SW
DOL. REC SW
I REC SW
II REC SW
BOTH REC SW
COPY SW
BIAS
X2 SIG
BOTHREC
STOP
PAUSE
PAUSE
STOP
DUBBING
PAUSE
PAUSE
STOP
STOP
X2 COPY
STOP
STOP
REC
REC/PAUSE
PLAY
T1
T2
T·3
T·4
T·5
T·8

TIMING (mS)

T 1		T·8	30
T·2		T·9	
T·3	250	T·10	
T·4	60	T·11	
T·5	40	T·12	
T·6		T·13	
T·7		T·14	

LEADER END SENSING END 時の RELAY TIMING


RELAY
END
END
MODE I
II
PLAY
STOP
STOP
PLAY
REC
STOP
STOP
REC
DECK I ASSIST
T1
T1
DECK II ASSIST
T2
T·6
T2
IND NOW
ON
IND NEXT
ON
LINE MUTE
T·3
T·3
I REC MUTE
II REC MUTE
T·3
T·8
II PB SW
DOL REC SW
I REC SW
T·4
II REC SW
T 6
BOTH REC SW
COPY SW
BIAS
T·5

TIMING (mS)

T·1		T·8	30
T·2		T·9	
T·3	250	T·10	
T·4	60	T·11	
T·5	40	T·12	
T·6	70	T·13	
T·7		T·14	

13.SUPPLEMET FOR HEM, HB, D , D/G TYPES

The HEM, HB, D and D/G types are the same as the KU type with the exception of following sections.

Mark	Symbol & Description	Part No.				
		KU type	HEM type	HB type	D type	D/G type
⚠ ★	T1 Power transformer (120V)	RTT-411	....	....	....	....
	(220V/240V)	....	RTT-413	RTT-413	....	....
	(120V/220V/240V)	....	....	....	RTT-414	RTT-414
⚠ ★★	FU801, FU802 Fuse (800mA)	REK-079	....	....	REK-079	REK-079
	(T800mA)	....	REK-064	REK-099	....	....
⚠ ★★	FU803 Fuse (1.6A)	REK-074	....	....	REK-074	REK-074
	(T1.6A)	....	REK-069	REK-102	....	....
⚠ ★★	S1 Line voltage selector	....	....	....	RSX-057	RSX-057
⚠	AC power cord	RDG-048	RDG-027	RDG-032	RDG-050	RDG-050
⚠	Strain relief (for AC power cord)	REC-395	REC-396	REC-396	REC-395	REC-395
	Power supply unit	Non supply	Non supply	Non supply	Non supply	Non supply
	Power switch unit	Non supply	Non supply	Non supply	Non supply	Non supply
	Packing case (CT-S99WR[BK])	RHG-796	RHG-796	RHG-796	RHG-796	RHG-859
	Packing case (CT-S99WR)	....	RHG-797	....	....	....
	Pad F	RHA-271	RHA-271	RHA-271	RHA-271	RHA-270
	Pad R	RHA-273	RHA-273	RHA-273	RHA-273	RHA-272
	Vinyl bag	....	....	....	....	RHL-018
	Connection cord (for control)	....	....	....	....	RDE-081
	Operating instructions (English)	RRB-257	....	RRB-257	RRB-257	RRB-257
	(English/German/French/Italian)	....	RRE-081	....	....	....
	(Spanish — auxiliary)	....	....	....	RRD-077	....

- **Only the D/G type (U.S. Military model) comes with the side panels.**
- **Only the D/G type has the REMOTE CONTROL terminals.**
- **The Power switch unit and Power supply unit for D and D/G types are the same as the KU type.**
- **The Power switch unit and Power supply unit for HEM and HB types are the same as the KU type with the exception of following sections:**

POWER SWITCH UNIT

Mark	Symbol & Description	Part No.		Remarks
		KU, D, D/G	HEM, HB	
⚠	C1601 Ceramic capacitor	RCG-008	RCG-009 (VCG-033) (VCG-044)	KU, D, D/G : 0.01/AC250V HEM, HB : 0.01/AC400V

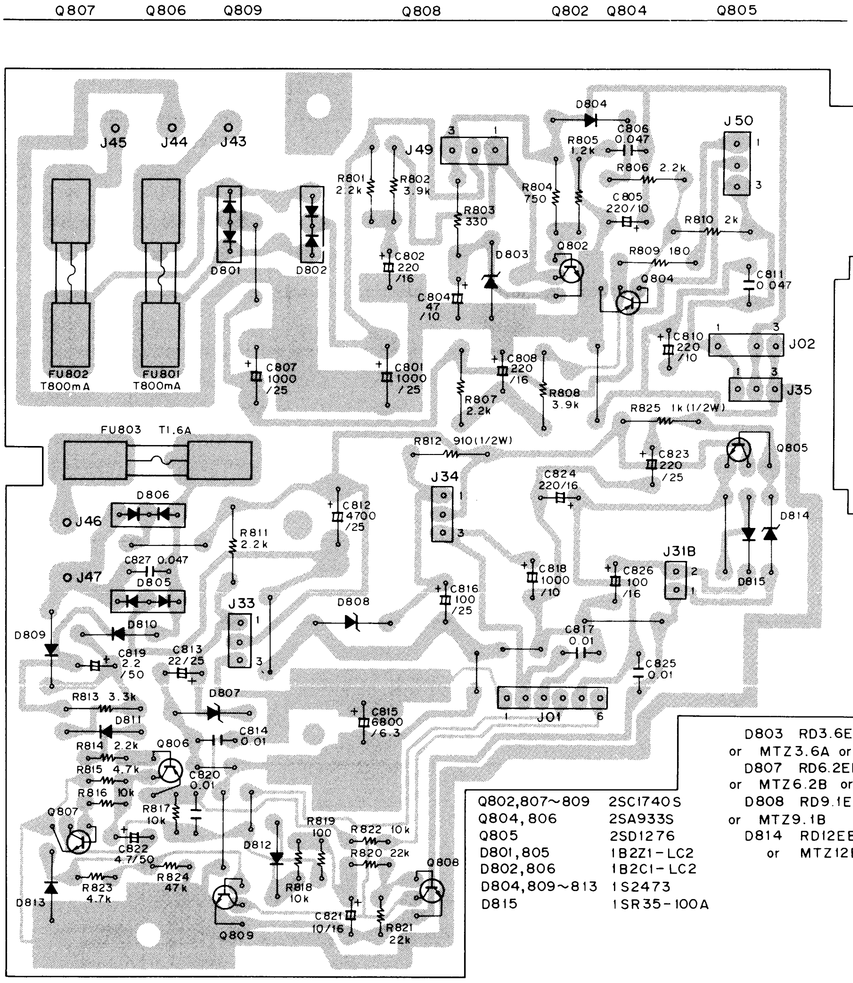
POWER SUPPLY UNIT

Mark	Symbol & Description	Part No.		Remarks
		KU, D, D/G	HEM, HB	
	C827	....	CKDYF473Z50	

- **Main unit for D/G type is the same as the KU type with the exception of following sections:**

Mark	Symbol & Description	Part No.		Remarks
		KU, HEM, HB, D	D/G	
★	D319—D321 Diode	....	1S2473	for remote control input
	Phone jack (Remote control)	....	RKN--71	

Power Supply Unit for HEM and HB Type


Q807
Q806
Q809
Q808
Q802
Q804
Q805
J45
J44
J43
J49
J50
D804
C806 0.047
R805 1.2k
R806 2.2k
R801 2.2k
R802 3.9k
R803 330
R804 750
C805 220/10
R810 2k
R809 180
D801
D802
D803
C802 220/16
C804 47/10
C811 0.047
C810 220/10
J02
J35
FU802 T800mA
FU801 T800mA
C807 1000/25
C801 1000/25
C808 220/16
R807 2.2k
R808 3.9k
R825 1k (1/2W)
FU803 T1.6A
R812 910 (1/2W)
C823 220/25
J34
C824 220/16
D806
J46
C812 4700/25
R811 2.2k
D814
C827 0.047
J47
D805
J31B
C818 1000/10
C826 100/16
D815
C816 100/25
J33
D808
D810
D809
C819 2.2/50
C813 22/25
C817 0.01
C825 0.01
R813 3.3k
D807
D811
C815 6800/6.3
J01
R814 2.2k
C814 0.01
R815 4.7k
C820 0.01
R816 10k
R817 10k
C822 4.7/50
R819 100
R822 10k
R820 22k
D812
R823 4.7k
R824 47k
R818 10k
C821 10/16
R821 22k
D813

Q802,807~809	2SC1740S
Q804,806	2SA933S
Q805	2SD1276
D801,805	1B2Z1-LC2
D802,806	1B2C1-LC2
D804,809~813	1S2473
D815	1SR35-100A

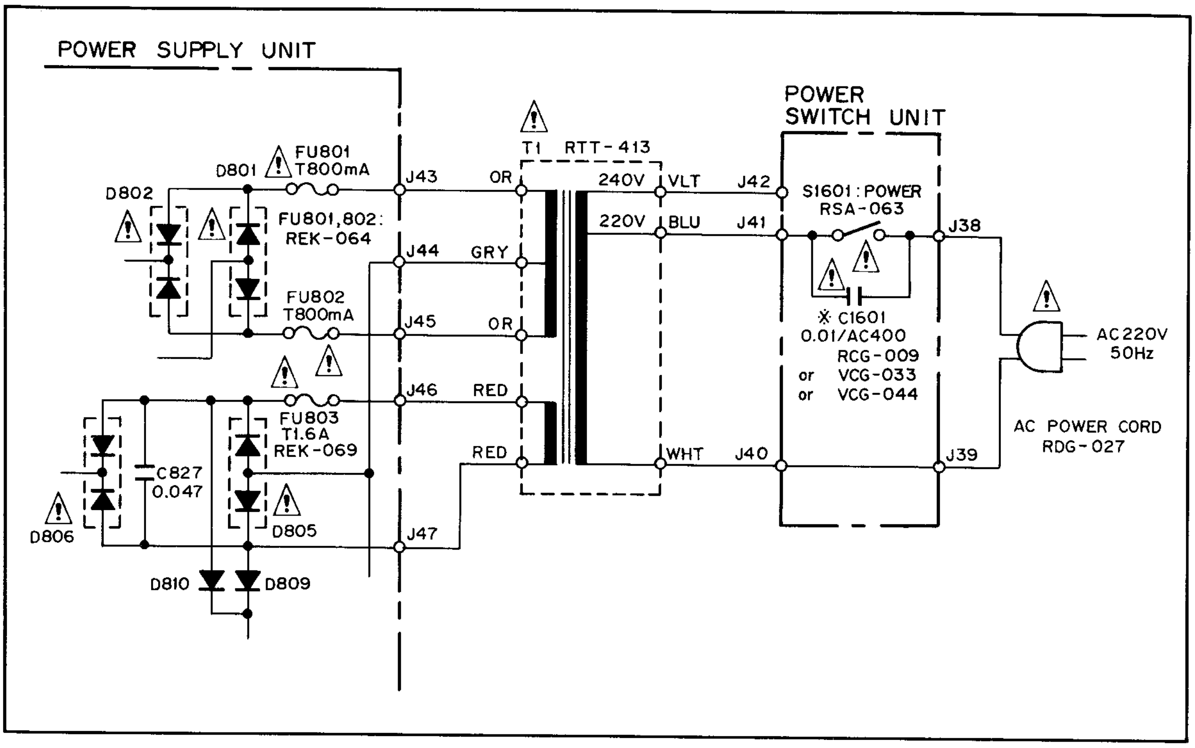
D803 RD3.6EB1 or RD3.6EB2
or MTZ3.6A or MTZ3.6B
D807 RD6.2EB2 or RD6.2EB3
or MTZ6.2B or MTZ6.2C
D808 RD9.1EB2
or MTZ9.1B
D814 RD12EB2
or MTZ12B

Line Voltage Selection for HEM and HB Types

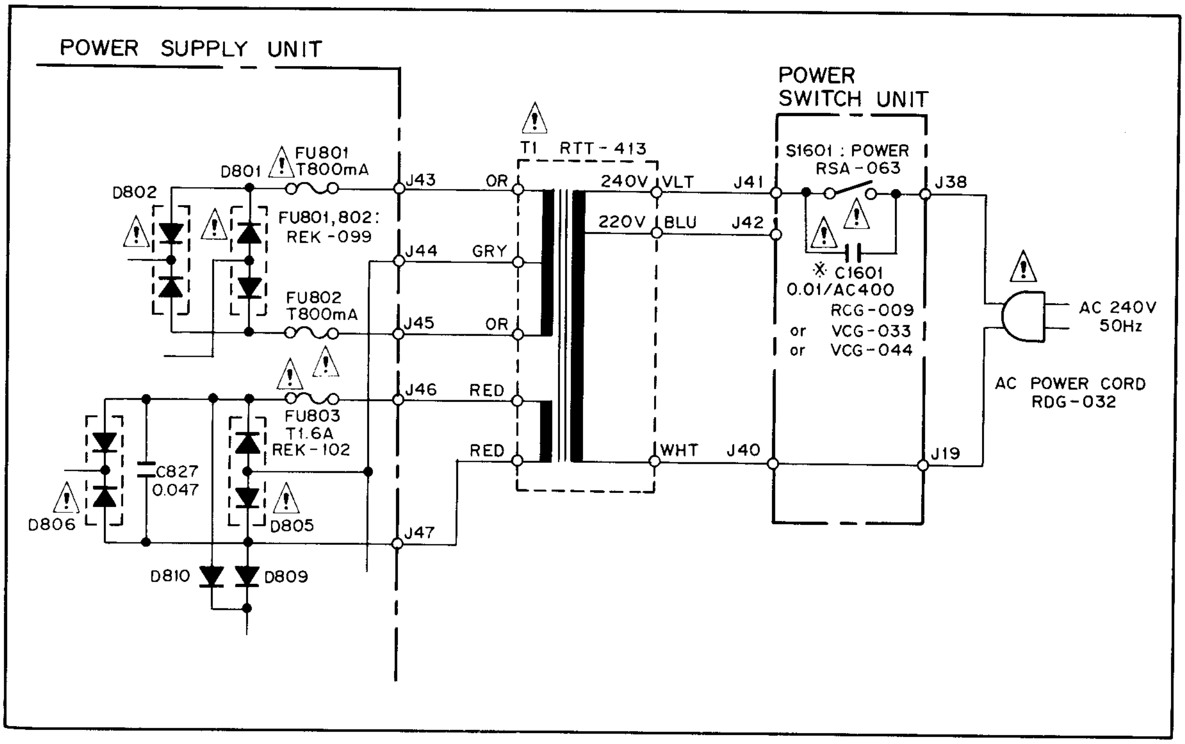
1. Disconnect the AC power cord.
2. Remove the bonnet case.
3. Change the connection of the power transformer primary lead wires as follows:
   220V : Connect the violet lead wire to the J42 terminal on the power supply unit, and connect the blue lead wire to the J41 terminal.
   240V : Connect the violet lead wire to the J41 terminal on the power supply unit, and connect the blue lead wire to the J42 terminal.
4. Stick the line voltage label on the rear panel.

Description	Part No.
220V label	AAX-193
240V label	AAX-192

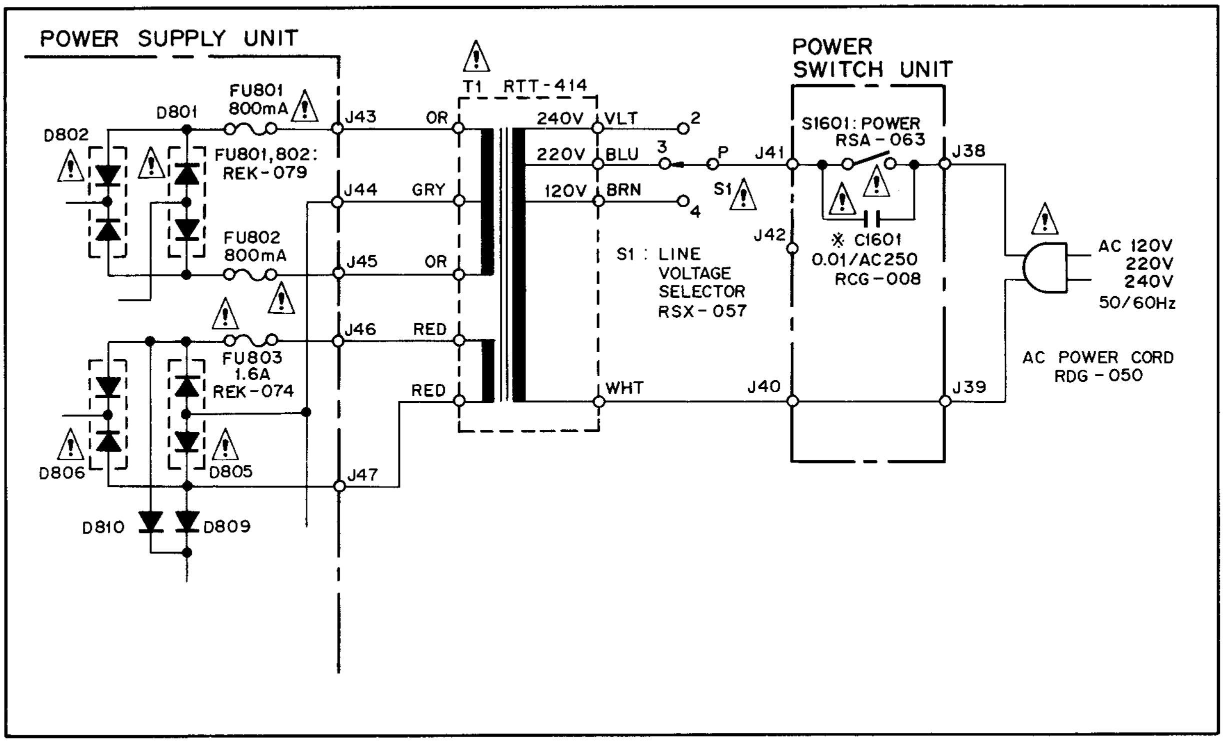
Power Supply Circuit for HEM Type


POWER SUPPLY UNIT
D802
D801
FU801
T800mA
FU801,802:
REK-064
FU802
T800mA
FU803
T1.6A
REK-069
C827
0.047
D806
D805
D810
D809
J43
J44
J45
J46
J47
OR
GRY
OR
RED
RED
T1 RTT-413
240V
220V
VLT
BLU
WHT
J42
J41
J40
POWER
SWITCH UNIT
S1601 : POWER
RSA-063
※ C1601
0.01/AC400
RCG-009
or VCG-033
or VCG-044
J38
J39
AC220V
50Hz
AC POWER CORD
RDG-027

Power Supply Circuit for HB Type


POWER SUPPLY UNIT
D802
D801
FU801
T800mA
FU801,802:
REK-099
FU802
T800mA
FU803
T1.6A
REK-102
C827
0.047
D806
D805
D810
D809
J43
J44
J45
J46
J47
OR
GRY
OR
RED
RED
T1 RTT-413
240V
220V
VLT
BLU
WHT
J41
J42
J40
POWER
SWITCH UNIT
S1601 : POWER
RSA-063
※ C1601
0.01/AC400
RCG-009
or VCG-033
or VCG-044
J38
J19
AC 240V
50Hz
AC POWER CORD
RDG-032

Power Supply Circuit for D and D/G Type


POWER SUPPLY UNIT
D801
D802
D805
D806
D809
D810
FU801 800mA
FU801,802: REK-079
FU802 800mA
FU803 1.6A REK-074
J43
J44
J45
J46
J47
OR
GRY
OR
RED
RED
T1 RTT-414
240V
220V
120V
VLT
BLU
BRN
WHT
2
3
4
P
S1
S1 : LINE VOLTAGE SELECTOR RSX-057
POWER SWITCH UNIT
S1601: POWER RSA-063
※ C1601 0.01/AC250 RCG-008
J38
J39
J40
J41
J42
AC 120V 220V 240V 50/60Hz
AC POWER CORD RDG-050